FM 23-82

FIELD MANUAL

106-MM RECOILLESS RIFLE M40A2

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1973

DIGITIZED FOR
YOUR REVIEW AT
WWW.SMALLARMSOFTHEWORLD.COM
saw

8 00

FIELD MANUAL No. 23–82

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *30 July 1973*

106-MM RECOILLESS RIFLE M40A2

		Paragraph	Page
CHAPTER 1.	INTRODUCTION		
Section I.	Characteristics and principle of recoilless operation	1–1 —1–3	1–1
II.	Detailed discussion	1–4 —1–9	1–4
CHAPTER 2.	MECHANICAL TRAINING		
Section I.	Disassembly and assembly	2–1, 2–2	2–1
II.	Mechanical functioning	2–3 —2–7	2–5
III.	Stoppages and immediate action	2–8 —2–12	2–10
CHAPTER 3.	MECHANICAL TRAINING, CALIBER .50 SPOTTING GUN M8C		
Section I.	General description	3–1, 3–2	3–1
II.	Disassembly and assembly	3–3, 3–4	3–2
III.	Mechanical functioning	3–5 —3–8	3–5
IV.	Stoppages and immediate action	3–9 —3–11	3–8
CHAPTER 4.	REPAIR PARTS AND EQUIPMENT, AMMUNITION, AND MAINTENANCE		
Section I.	Repair parts and equipment	4–1 —4–5	4–1
II.	Ammunition	4–6 —4–12	4–3
III.	Maintenance	4–13—4–19	4–5
CHAPTER 5.	TECHNIQUE OF FIRE		
Section I.	General	5–1 —5–3	5–1
II.	Apparent speed estimation and lead determination	5–4 —5–6	5–7
III.	Fire commands	5–7—5–17	5–9
IV.	Fire control	5–18—5–24	5–12
V.	Weapon system alinement	5–25—5–27	5–18
VI.	Use of the crew-served weapon night vision sight	5–28—5–32	5–20
CHAPTER 6.	PREPARATORY MARKSMANSHIP		
Section I.	Duties	6–1 —6–3	6–1
II.	Crew drill	6–4 —6–16	6–3
III.	Gunner and assistant gunner training	6–17—6–24	6–7
IV.	Safety precautions and range procedures	6–25—6–32	6–15
V.	Crew training	6–33—6–39	6–19
VI.	Firing procedures	6–40—6–43	6–20
CHAPTER 7.	MARKSMANSHIP		
Section I.	Qualification firing	7–1 —7–5	7–1
II.	Familiarization	7–6, 7–7	7–7
III.	Night fire training	7–8 —7–10	7–8
CHAPTER 8.	ADVICE TO INSTRUCTORS	8–1 —8–7	8–1
APPENDIX A.	References		A–1
INDEX			Index–1

---

*This manual supersedes FM 23–82, 28 May 1964, including all changes.

CHAPTER 1

INTRODUCTION

Section I. CHARACTERISTICS AND PRINCIPLE OF RECOILLESS OPERATION

1–1. Purpose and Scope

a. This manual is a guide in training infantry antitank squads with the 106-mm recoilless rifle, M40A2. Certain modifications may be necessary because of the time, troops, facilities, and ammunition available to the using unit. When feasible, the suggestions, tables, and procedures described herein should be complied with.

b. This manual covers functioning, mechanical training, parts and equipment, ammunition, maintenance, technique of fire, preparatory marksmanship training, marksmanship, and advice to instructors.

c. Users of this manual are encouraged to submit recommended changes or comments to improve it. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. **Comments should** be prepared using DA Form 2028 (Recommended Changes to Publications) **and forwarded direct to the Commandant, US Army Infantry School, Fort Benning, Georgia 31905.**

1–2. Characteristics

a. The 106-mm recoilless rifle is a lightweight recoilless weapon designed for both antitank and antipersonnel roles. It is a breech-loaded, single-shot recoilless rifle. It is equipped with a manually operated breech mechanism and a percussion-type firing mechanism.

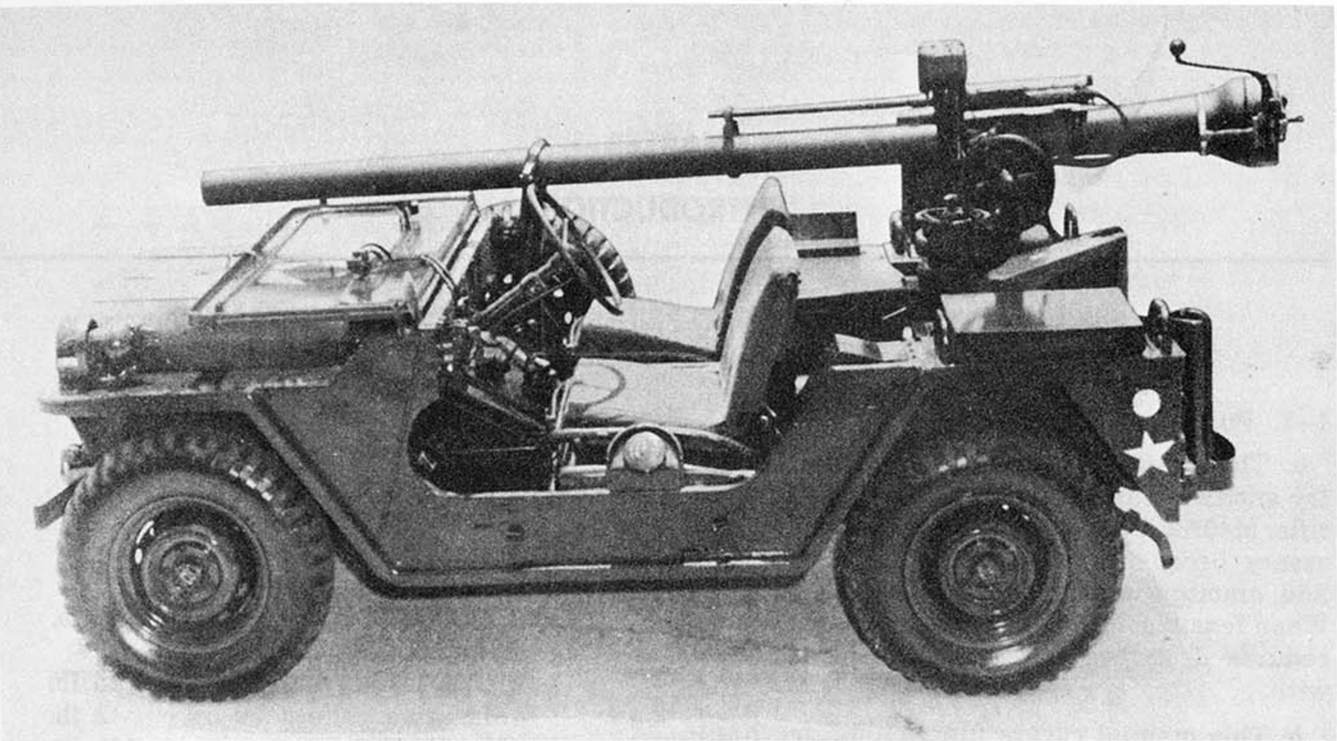
b. The standard mount (M79) for the rifle serves to attach the rifle to the truck and to support the rifle when it is employed in the ground mounted role (1, 2, 3, 4, fig 1–1).

c. The 106-mm recoilless rifle, M40A1, is now 106-mm cannon, M206. The 106-mm cannon, M206, with caliber .50 spotting gun, M8C, on mount, M79, is now the 106-mm recoilless rifle, M40A2.

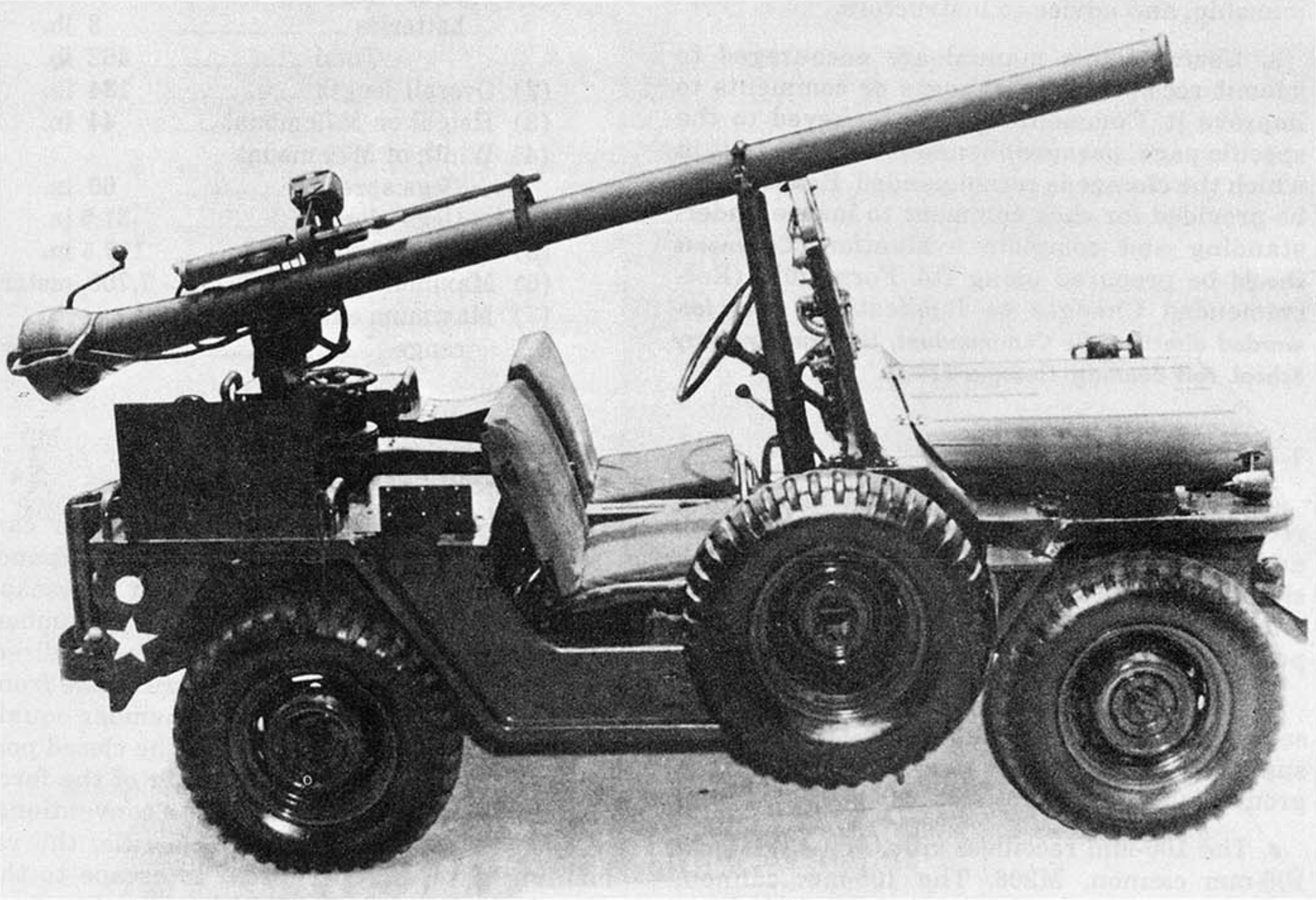
(1) Weights:	
106-mm cannon, M206, with sight brackets, cables, telescope mount M90, sight cover, and transfer box	251 lb.
Gun, spotting, caliber .50 (empty)	25 lb.
Magazine, caliber .50	2 lb.
Mount, M79	181 lb.
Telescope, elbow, M92 instrument light with batteries	3 lb.
Total	462 lb.
(2) Overall length	134 in.
(3) Height on M79 mount	44 in.
(4) Width of M79 mount	
(legs spread)	60 in.
(legs closed)	31.5 in.
(5) Length of bore	107.5 in.
(6) Maximum range	7,700 meters
(7) Maximum effective range	1,100 meters

1–3. Principle of Recoilless Operation

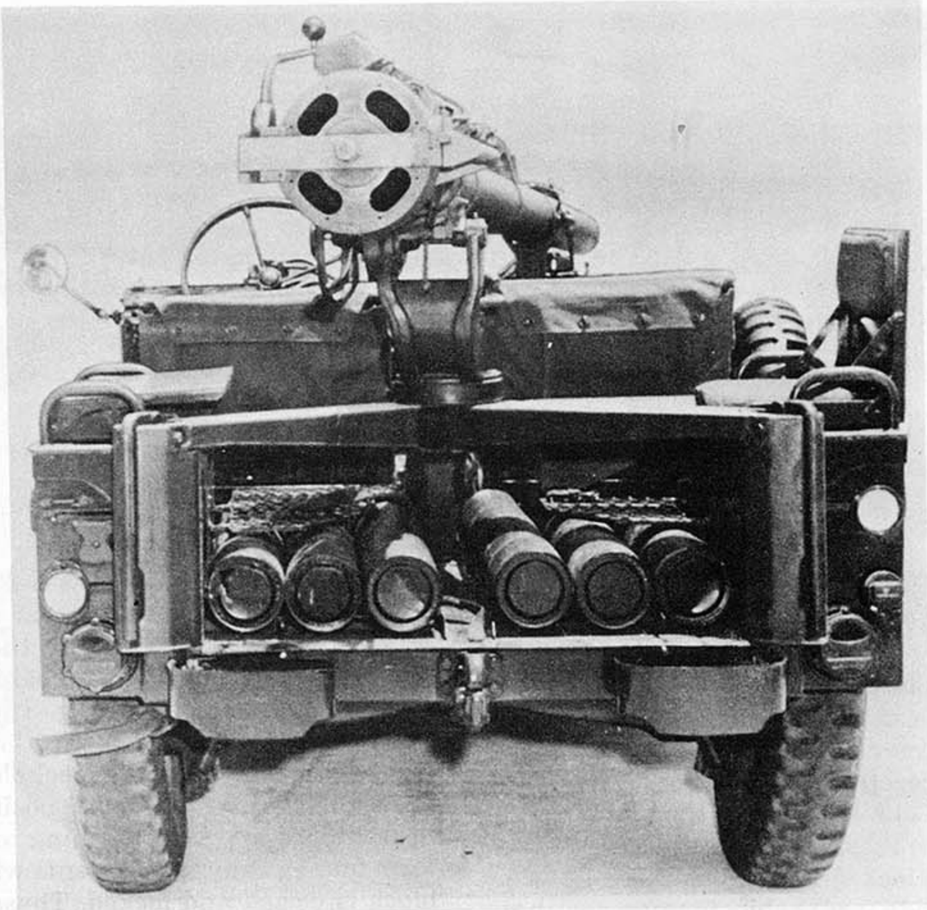
The 106-mm recoilless rifle ammunition cartridge case is perforated to permit the expanding gases of the ignited propellant to escape evenly into the enlarged reaction chamber. These gases exert equal pressure in all directions within the chamber. Pressure to the front against the sloping wall of the chamber equals the pressure to the rear against the closed portions of the breech. The remainder of the force exerted by the gases would cause a conventional weapon to recoil. In a recoilless rifle, the remaining gases are permitted to escape to the rear through openings in the breech, therefore, the rifle remains motionless when fired (fig 1–2).



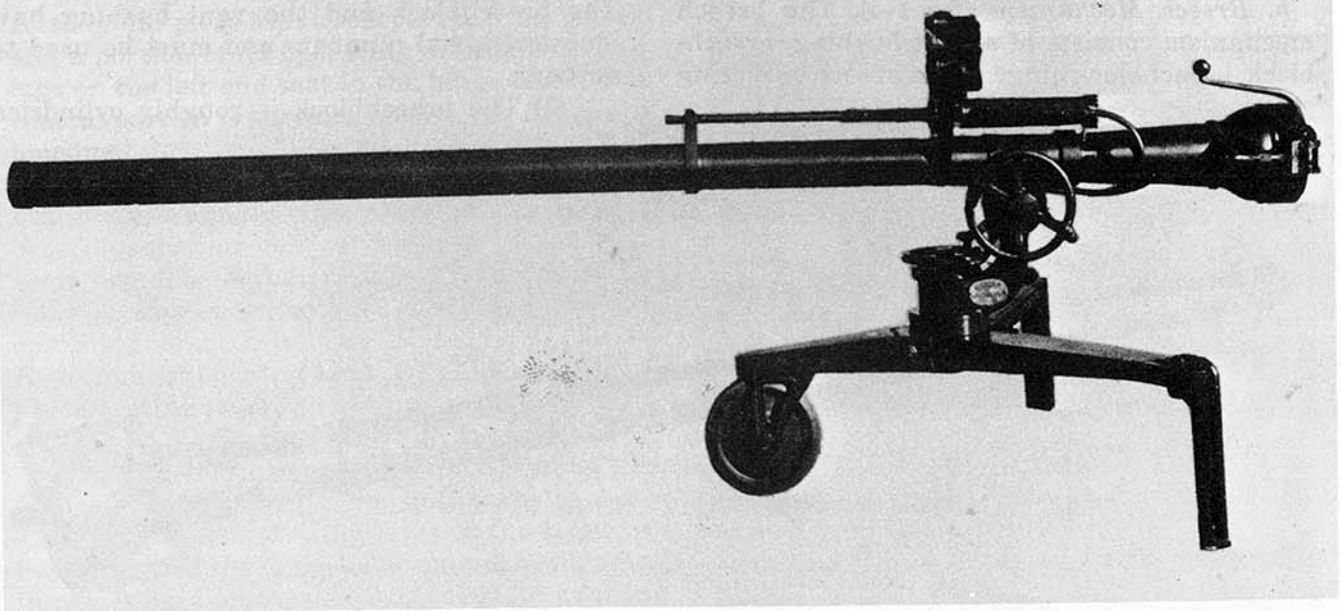
Mounted on ¼-ton truck, M151A1C, left side view.
Figure 1–1. 106-mm recoilless rifle, M40A2.



Mounted on ¼-ton truck, M151A1C, right side view, with barrel traveling lock in extended position.
Figure 1–1—Continued.



Mounted on ¼-ton truck, M151A1C, rear view.
Figure 1–1—Continued.



Mounted on M79 ground mount.
Figure 1–1—Continued.

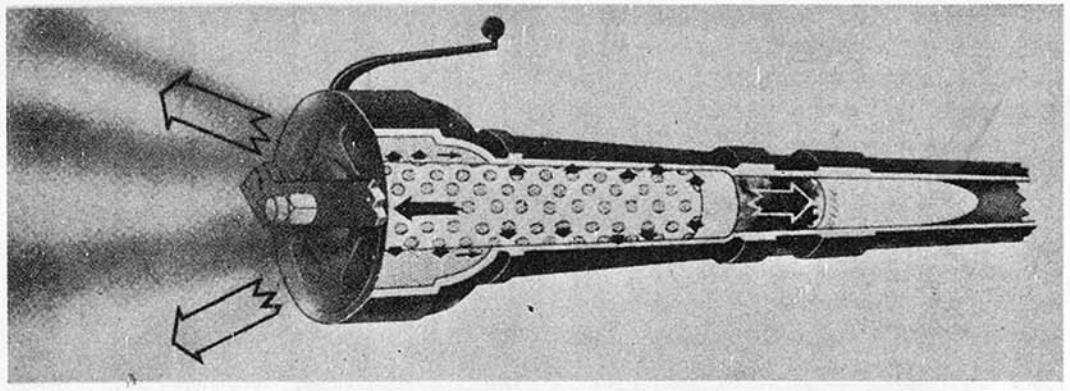


Figure 1–2. Action of gases.

Section II. DETAILED DISCUSSION

1–4. 106-mm recoilless Rifle, M40A2.

a. Cannon M206. The M206 cannon (fig 1–3) consists of a tube, an enlarged reaction chamber, and a mounting bracket. The tube is threaded at the rear to receive the reaction chamber. The inner breech end of the chamber is threaded to receive the vent bushing. Holes are provided on the left side of the chamber at the breech end to receive screws that secure the hinge block and lock the vent bushing in place. On the right side are holes for screws that fasten the trigger housing to the chamber. One screw also secures the vent bushing. The carrying handle bracket is tightly fitted and keyed to the chamber. A lanyard rod is provided at the front end of the trigger housing for emergency firing if the firing cable or mechanism is damaged.

b. Breech Mechanism (fig 1–4). The breech mechanism consists of a vent bushing, breechblock, breechblock hinge, and a breech operating group,

(1) The vent bushing is a short steel cylinder threaded to fit into the rear of the chamber. When a round is loaded into the chamber, the rim of the cartridge case is seated in the center portion of the vent bushing. The vent bushing has interrupted threads that mate with interrupted threads on the breechblock to lock the breechblock in the closed position. Both the breechblock and vent bushing are machined to form four equally spaced vents when the breechblock is closed and locked. These vents control the escape of propellant gases to the rear. The left side of the vent bushing contains a recess for the cartridge case detent (fig 1–4). The vent bushing contains a compensating ring which is to be adjusted by ordnance troops only. It is at the forward end of the vent bushing and allows for an adjustment to correct movement of the weapon instead of replacing the vent assembly. The breechblock and the vent bushing have identical serial numbers and must be used together.

(2) The breechblock is roughly cylindrical in shape (fig 1–5). It contains an axial bore to receive the firing pin housing.

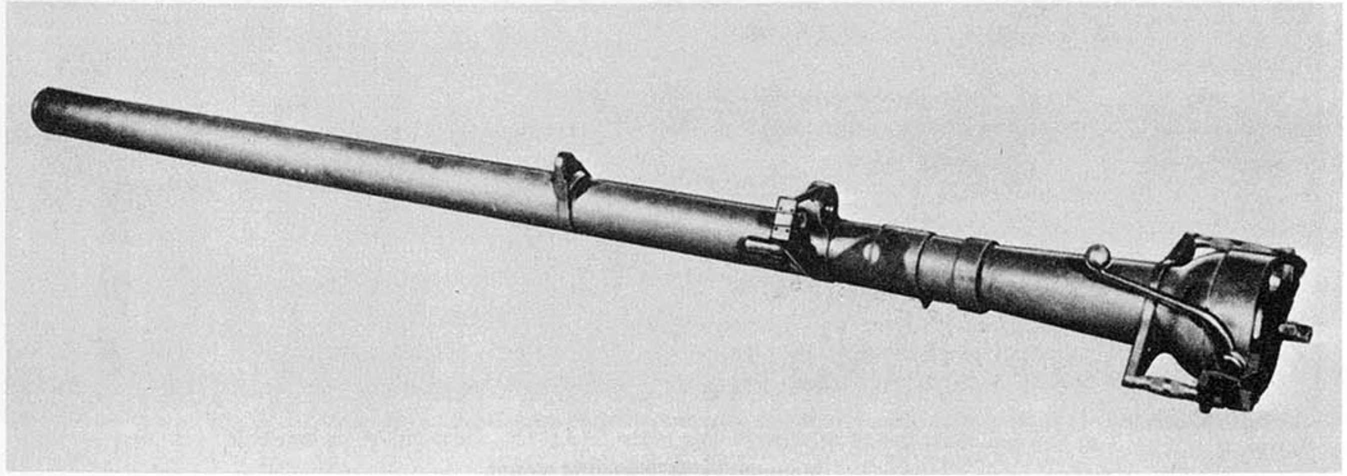


Figure 1–3. Cannon M206, 106-mm recoilless rifle.

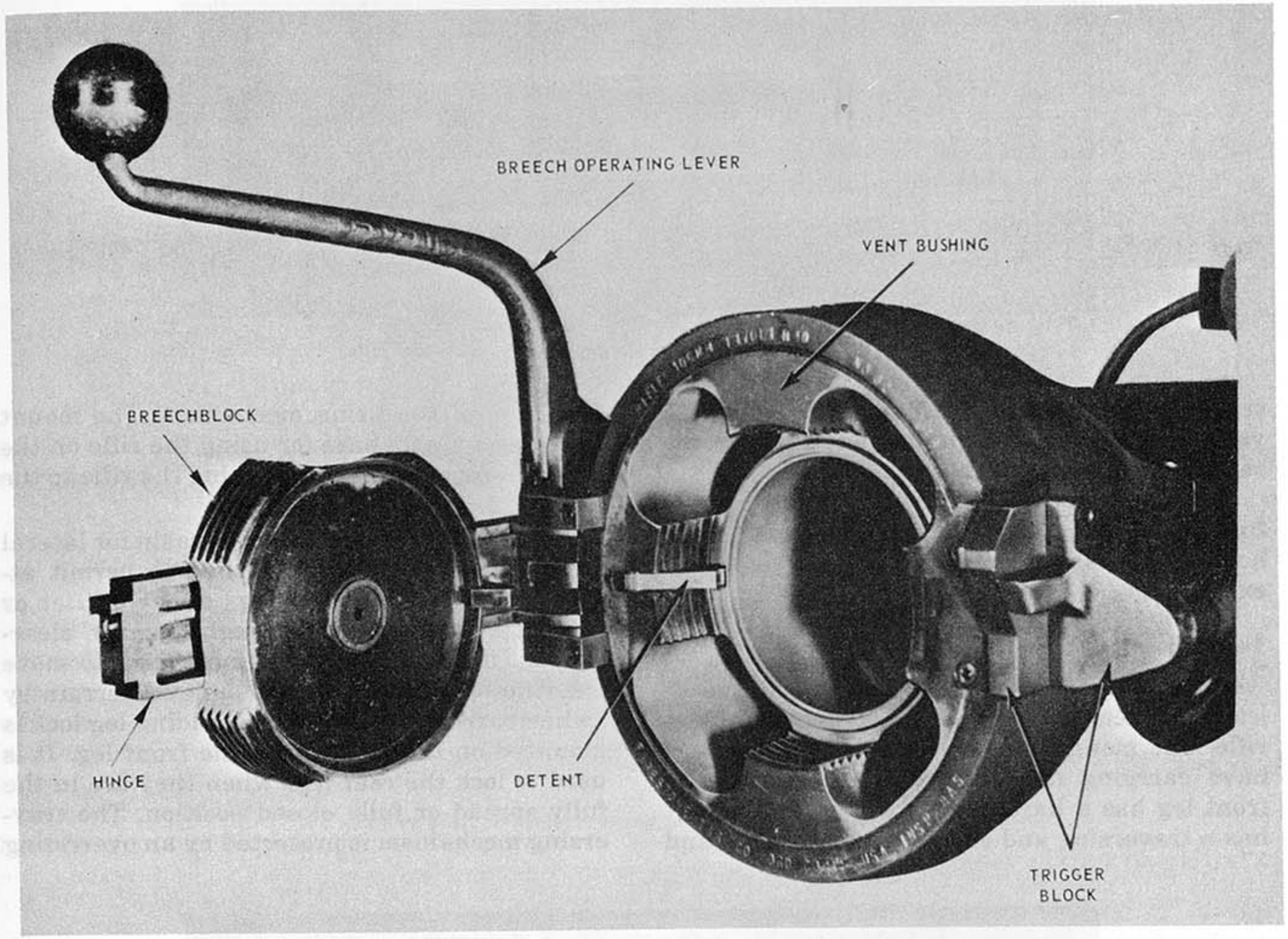


Figure 1–4. Breech mechanism, 106-mm recoilless rifle.

(3) The breechblock hinge (fig 1–6) is a rectangular piece that supports the breechblock and a portion of its operating mechanism. Two lugs on the left end seat in the hinge block. The central portion is bored to receive the firing pin housing.

(4) The breech operating group consists of a cam plate, coupling ring, coupling ring rollers, breech operating lever, and a breech operating lever dog. The Woodruff key of the operating lever is undersized so that it will shear if the operating lever is struck by excessive force. Replacement keys are kept in the ball handle of the operating lever.

c. Firing Mechanism.

(1) The M79 mount (fig 1–7) contains the firing knob and firing housing transfer box. The firing tang and firing lever in the transfer box mate with the firing cable operating lever in the quick breakdown sleeve on the M206 cannon barrel group.

(2) The firing cable operating lever in the quick breakdown sleeve activates the firing cable which is attached to the trigger in the right carrying handle bracket group.

(3) The right bracket group contains the

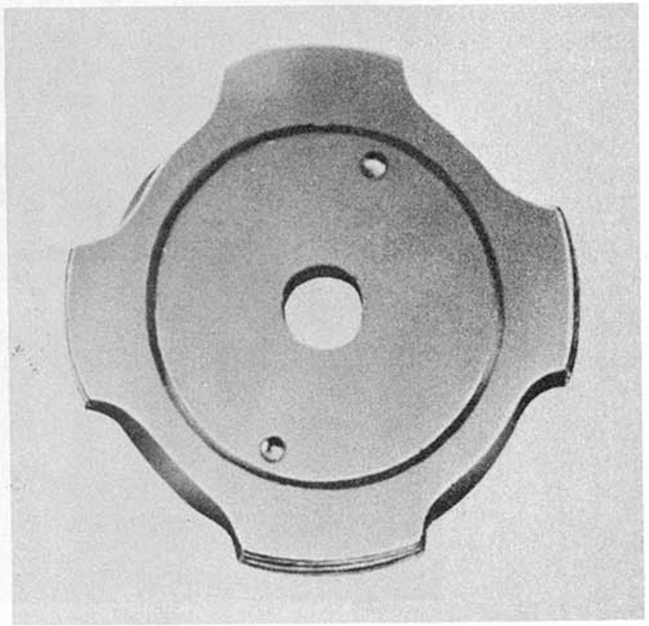


Figure 1–5. Breechblock, 106-mm recoilless rifle.

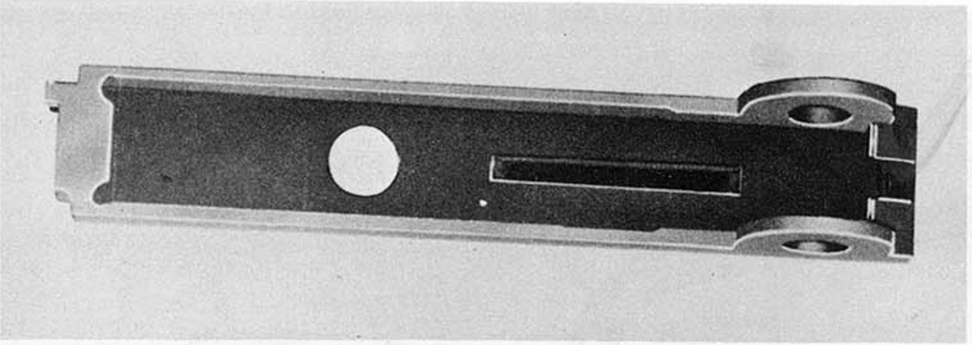


Figure 1–6. Breechblock hinge, 106-mm recoilless rifle.

trigger, trigger housing, trigger spring, and lanyard. The trigger and the lanyard activate the sear in the breechblock.

(4) The breechblock contains the firing pin, firing pin spring, firing pin housing, firing pin housing cap, sear, cam plate, cocking cam, and extractor.

1–5. Mount, M79

a. The M79 mount (fig 1–7) is designed specifically to accommodate the 106-mm recoilless rifle. The mount is a tripod. The two rear legs have carrying handles and clamps, and the front leg has a hard rubber wheel. The mount has a traversing and elevating mechanism and a portion of the firing mechanism. The mount provides a stable base for using the rifle on the ground and a means of attaching the rifle to the carrier.

b. The two rear legs are adjustable for lateral expansion. They can be opened to permit attachment to the rear corners of the carrier or closed for movement through narrow clearances. This enables two or more men to move the rifle for short distances on level terrain by "wheelbarrowing" (fig 1–8). A folding leg lock is mounted on the left side of the front leg. It is used to lock the rear legs when they are in the fully spread or fully closed position. The traversing mechanism is protected by an overriding

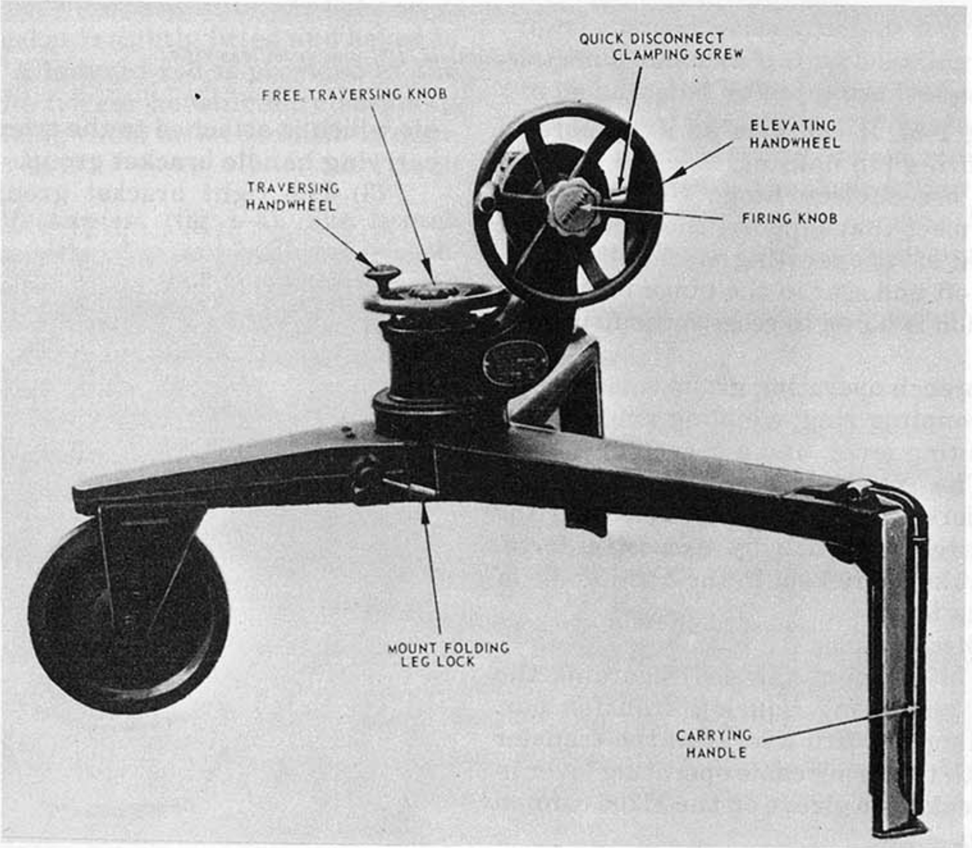


Figure 1–7. Mount, M79.

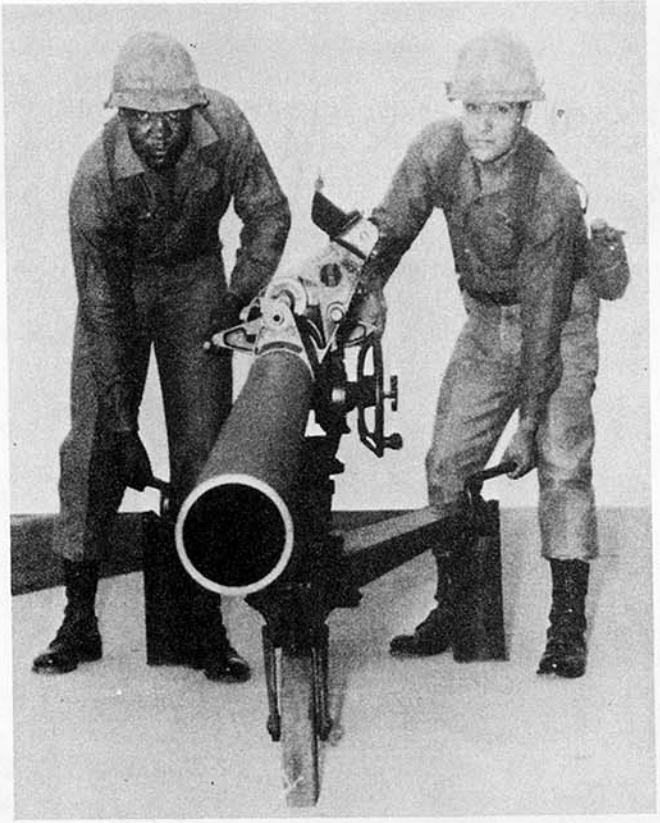


Figure 1–8. Wheelbarrowing the 106-mm recoilless rifle.

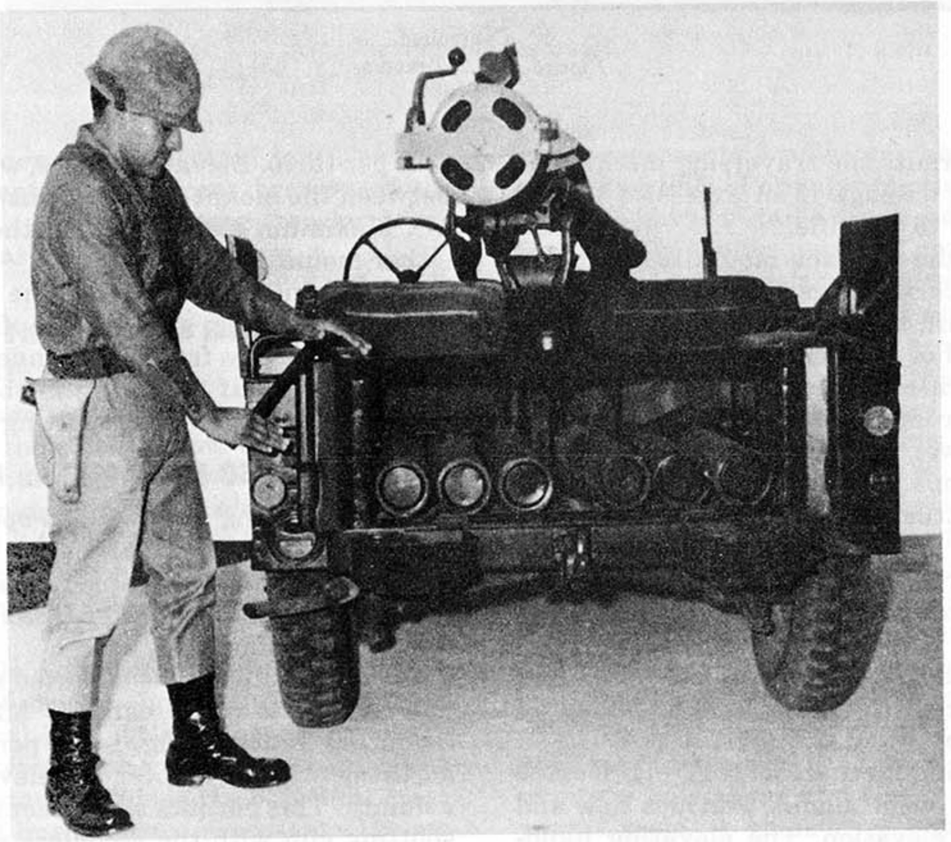
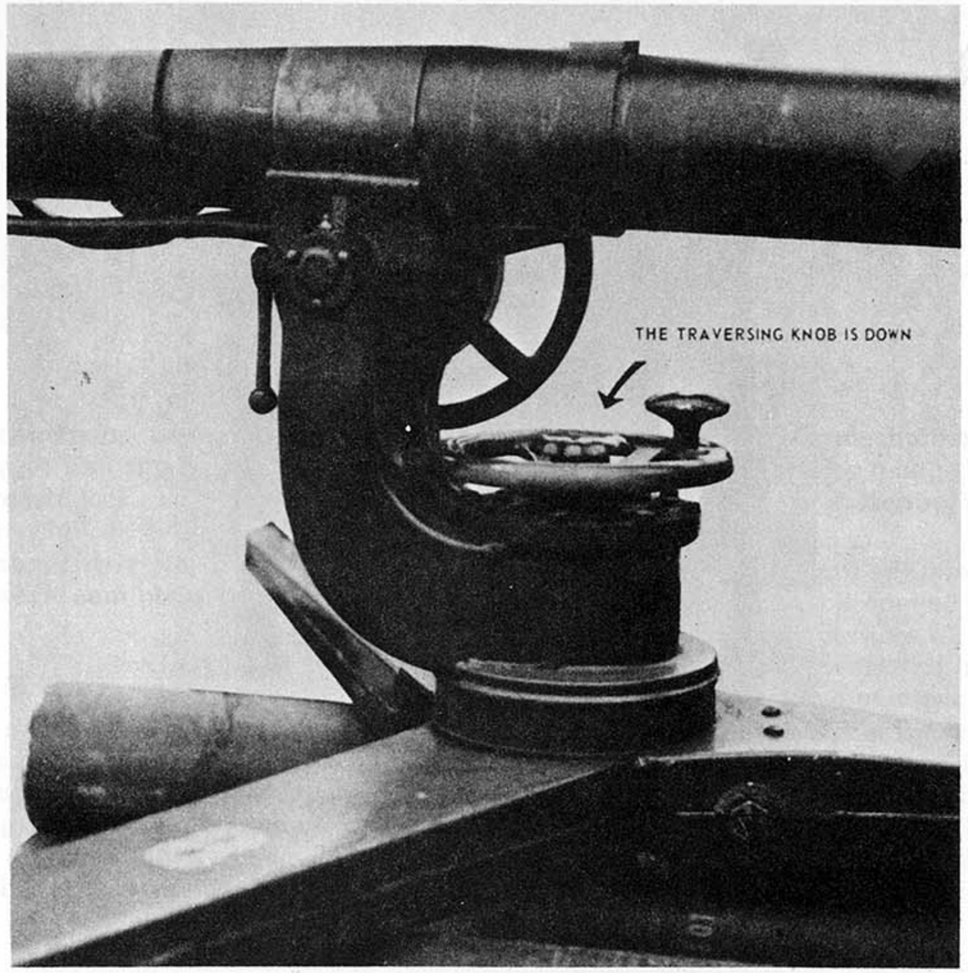


Figure 1–9. Locking the mount to the ¼-ton truck.



1. Controlled.
Figure 1–10. Traverse.

clutch. This permits the traversing mechanism to slip without damage if an excessive lateral force is applied to the rifle.

c. To attach the rifle and mount to the truck, spread and lock the legs in the fully spread position and lift the weapon onto the truck. With the wheel of the mount on the bed of the truck, roll the rifle and mount forward until the ends of the rear legs contact the rear corners of the truck. Lower the carrying handles. This raises the clamps against the inside lip of the corners of the truck and locks the mount to the truck (fig 1–9).

d. The traversing mechanism permits 360° of controlled or free traverse. For controlled traverse, the free traversing knob is *down* (controlled traverse position) (1, fig 1–10). For free traverse, the free traversing knob is pulled *up* (free traverse position) (2, fig 1–10).

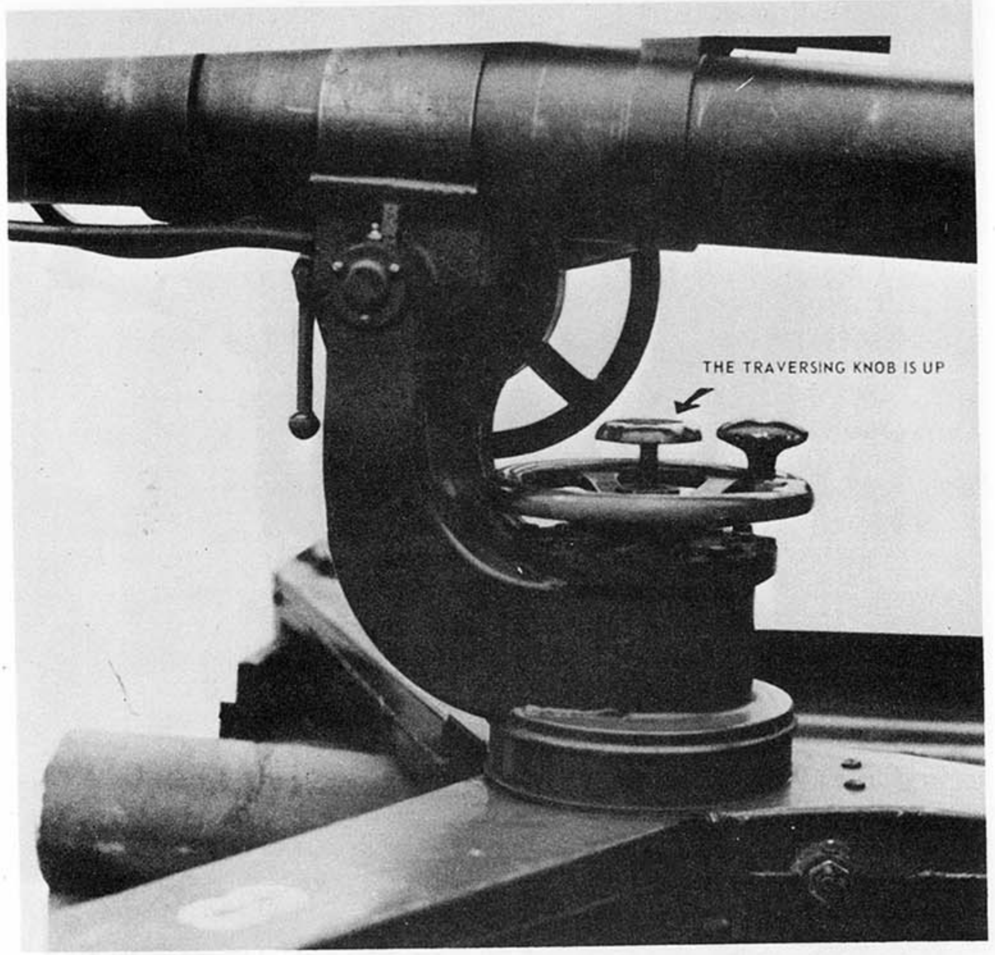
e. The elevating mechanism (fig 1–11) located on the left side of the mount, provides slow and rapid rates of elevation. The elevating handwheel gives rapid elevation (16 miles per turn) while the firing knob gives slow elevation (3.8 mils per turn). Elevation limits, with the breech between the mount legs, are plus 65° and minus 17°. Maximum elevation with the breech over either mount leg is plus 27°.

f. The firing knob fires both the recoilless rifle and the spotting gun. If the firing knob is pushed *in* (away from the gunner), the recoilless rifle fires. If the firing knob is pulled *out* (toward the gunner), the spotting gun fires.

1–6. Caliber .50 Spotting Gun, M8C

a. The spotting gun is a gas-operated, magazine-fed, semi-automatic weapon. It is to assist the gunner in determining range and leads to the target. This gun fires special caliber .50 spotting ammunition.

b. The spotting gun is mounted above the 106-mm recoilless rifle cannon M206. A front mounting bracket (fig 1–12) permits 11 mils adjustment from center in elevation and in azimuth. This permits adjustments to aline the spotting gun with the recoilless rifle. The rear mounting bracket for the spotting gun is attached to the tube by a spherical joint. The rear bracket operates as a universal joint, permitting adjustments at the front bracket of the spotting gun. Both mounting brackets are tightly fitted around the rifle tube.



2. Free.
Figure 1–10—Continued.

1–7. Direct Fire Sight: Elbow Telescope, M92D or M92F

a. The 106-mm recoilless rifle is equipped with the M92D or the M92F elbow telescope (fig 1–13). These sights are used for direct fire up to a maximum range of 2,400 yards for the M92D telescope and 2,400 meters for M92F telescope. Both telescopes have a fixed focus, 3-power magnification, and a field of view of 12 degrees, 12 minutes.

b. The reticle pattern (fig 1–14) of both sights is a series of broken horizontal lines and a broken vertical line. At the top center of the pattern is a crosshair representing zero deflection and zero range. This is the boresight cross. Each vertical line or space represents 100 meters of range for the M92F and 100 yards of range for the M92D. Each horizontal line or space represents 5 miles per hour of apparent speed or 5 mils of angular measurement.

c. The curved stadia lines aid in estimating range. The center point of the small circles within the reticle pattern represents the beginning or end of lead lines that are eliminated to provide a clear field of view through the reticle. The small circle located at the center of the 2200-meter range line is used in conjunction with aiming stake lights during night firing. At the bottom of the reticle is a horizontal and vertical mil scale to permit emergency use of the direct sighting instruments for indirect fire. The horizontal mil scale is marked in 1 mil increments from 0 to 30 mils right and left of the vertical centerline. The first mark right or left of the centerline represents 2 mils. The mark for 1 mil is eliminated for clarity. At the center of the scale is a vertical mil scale. This vertical mil scale is graduated in 1-mil increments, 5 mils above and 5 mils below the horizontal scale. A cross-level bubble allows the gunner to eliminate cant from the sight by turning the cant correction knob on the sight

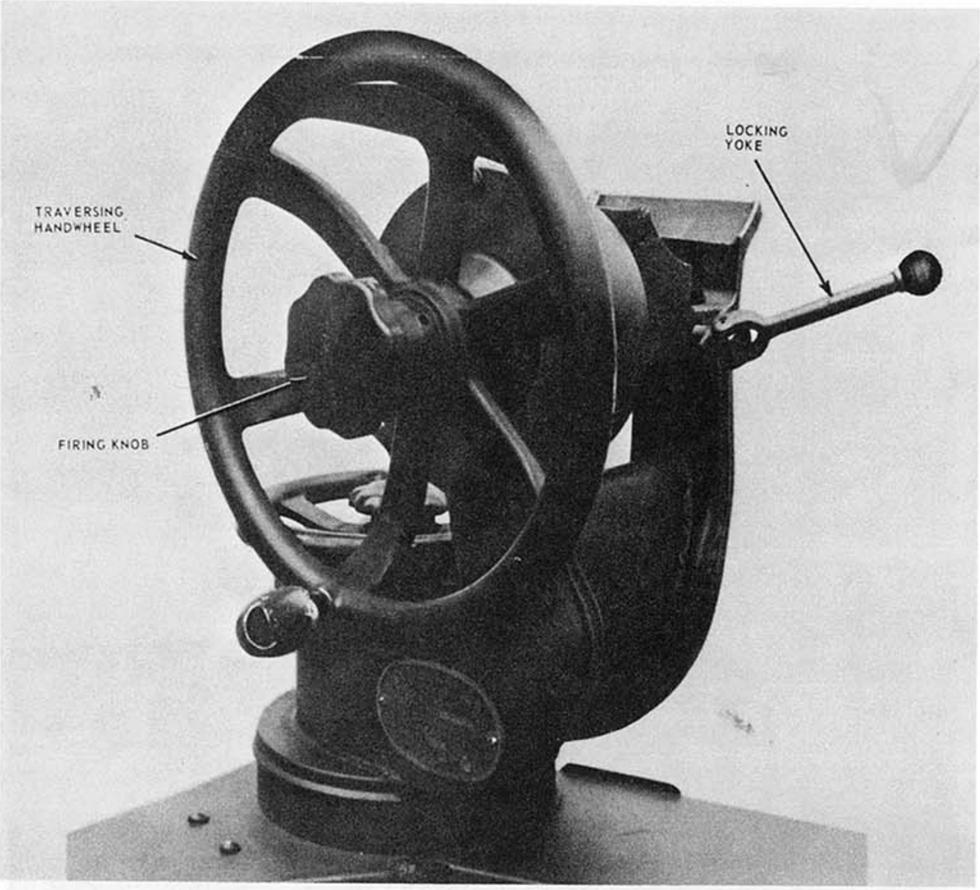


Figure 1–11. Elevating mechanism.

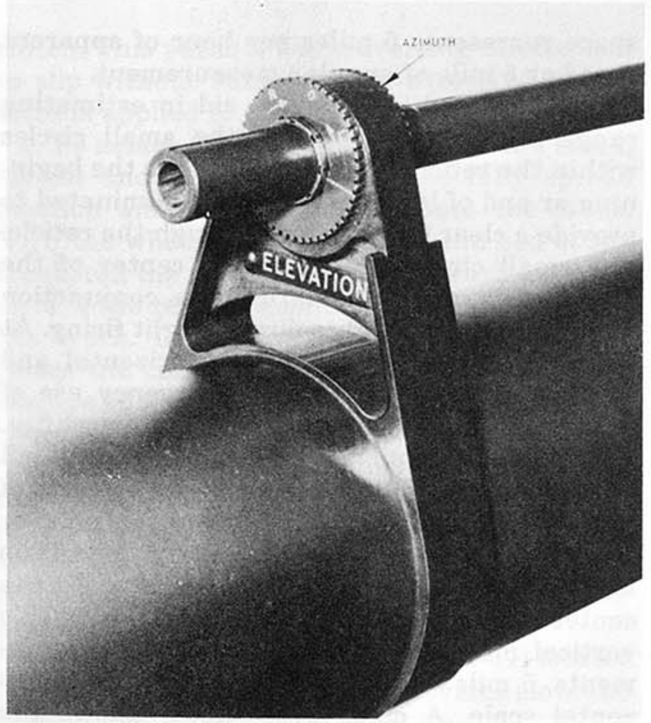


Figure 1–12. Front mounting bracket (spotting gun).

mount until the bubble is centered. The cant correction mechanism corrects cant up to 15 degrees left or right.

d. The forward portion of the telescopic sight is tapered to fit into the tapered sleeve of the mount. The telescope is inserted into the mount sleeve with the projections of the locking device engaging the grooves in the sleeve. The telescope is locked in the mount by pushing the telescope forward into the sleeve until the projections clear the forward ends of the grooves and turning the knurled lockscrew counterclockwise to draw the lock projections to the rear into their recesses in the mount. Notice that the telescope mount, M90, which is used with the elbow telescope, M92F or M92D, is constructed so that the objective lens of the telescope is protected. The mount, M90, incloses the cant correction mechanism and boresight correction mechanisms. The boresight mechanism permits changes of plus or minus 11 mils in elevation or azimuth by adjusting two screws located on the top of the mount, under a protective cover.

e. The M92F elbow telescope is a conversion of the M92D sight from yards to meters. This has been accomplished by changing only the reticle and the nameplate. The exterior configuration (fig 1–13) and the reticle pattern (fig 1–14) of the M92F sight are the same as the M92D sight.

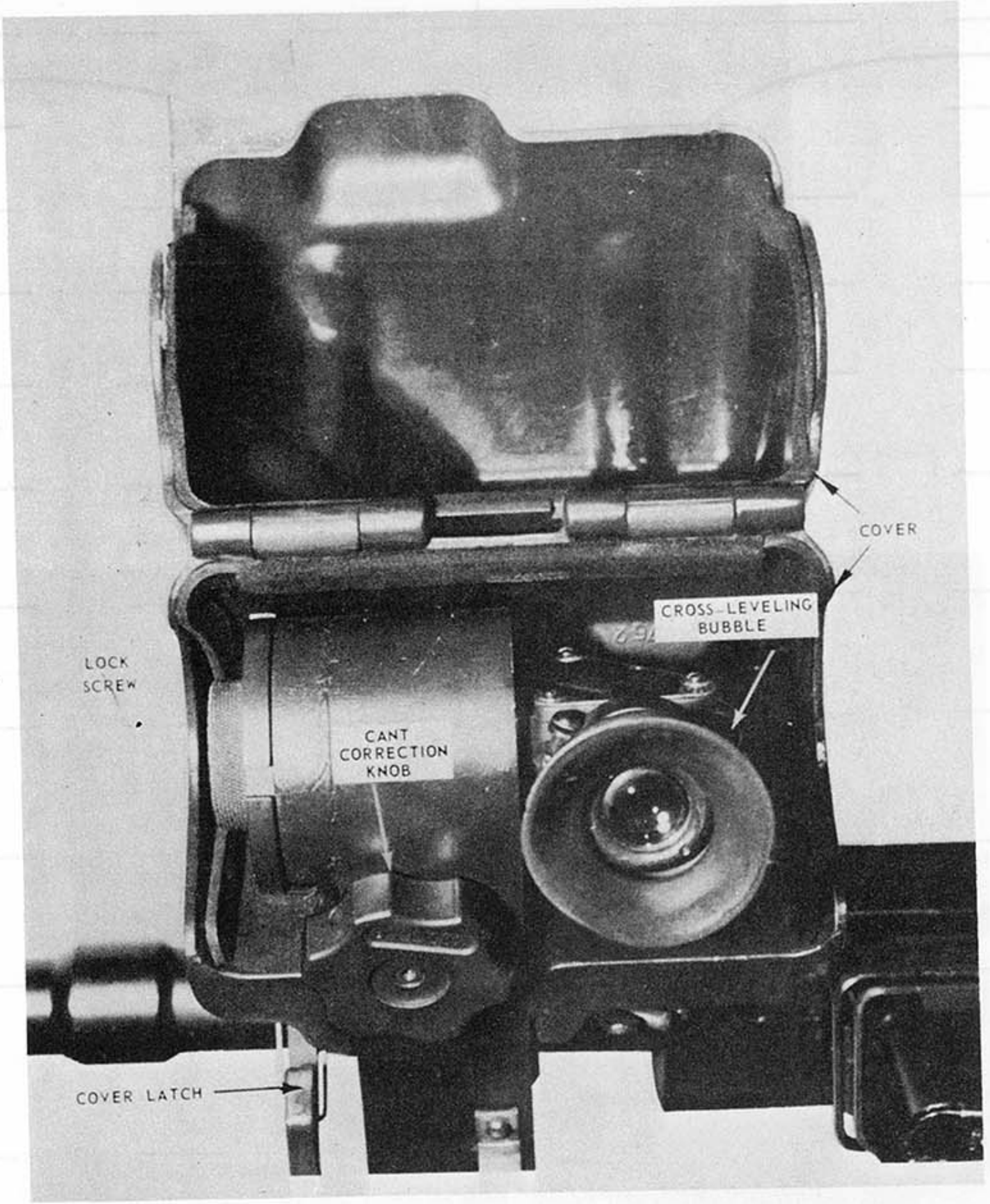


Figure 1–13. Elbow telescope, M92F, and mount, telescope, M90.

1–8. Instrument Light, M42 (1, fig 1–15)

Use of the M42 instrument light permits the sight reticles of the M92D and M92F elbow telescopes to be illuminated. A dovetail slot on the telescope receives the lamp bracket of the instrument light (2, fig 1–15). The instrument light is powered through a lead wire by two standard flashlight batteries in the battery case. A rheostat knob on the end of the battery case turns the light on and off and controls the amount of illumination in the sight reticle. A hand light with a lead wire is provided for general use around the rifle.

1–9. Miscellaneous Fire Control Equipment

a. Compass. For description and operation see FM 21–26.

b. Binoculars. For nomenclature, operation, and maintenance, see TM 9–1580.

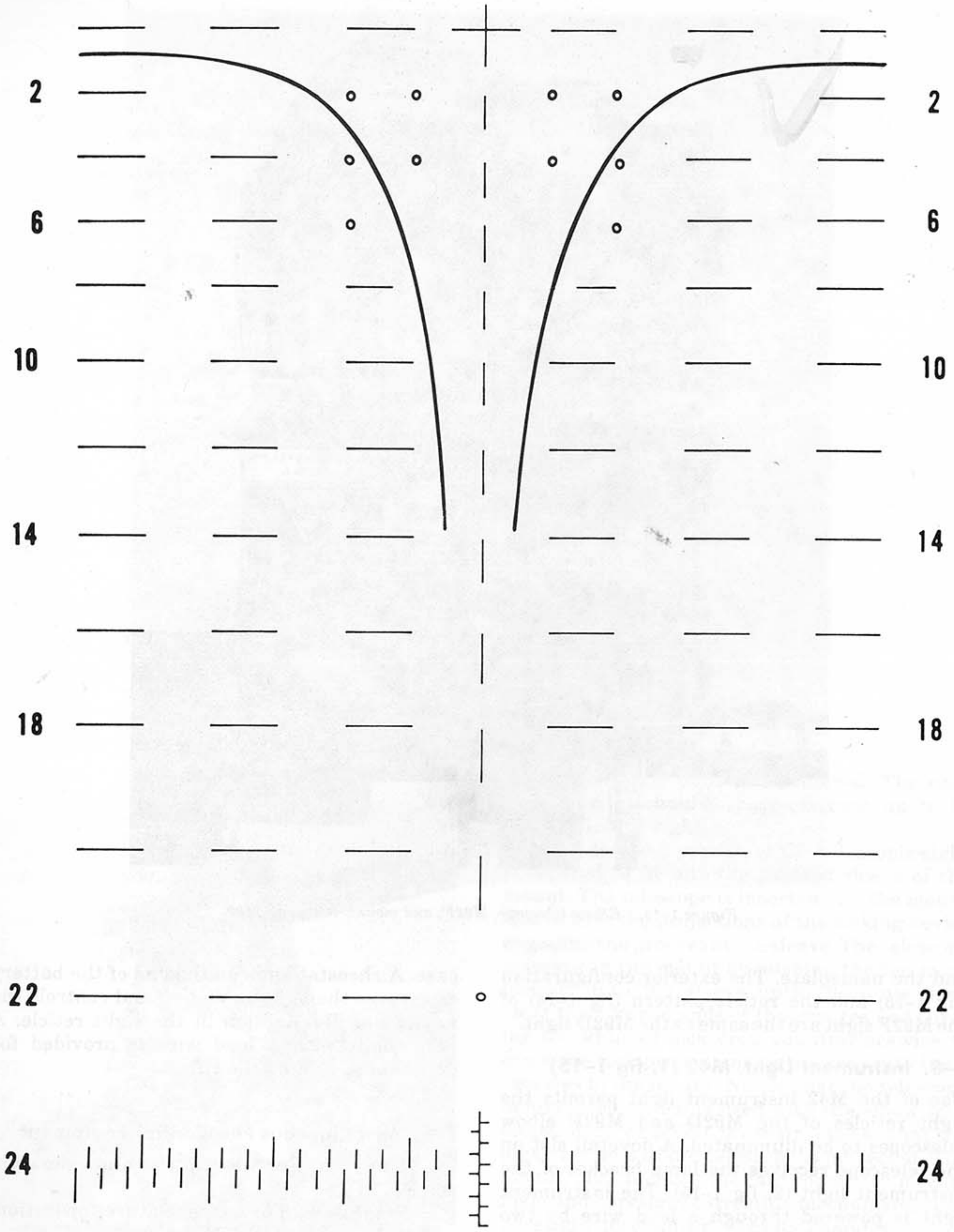
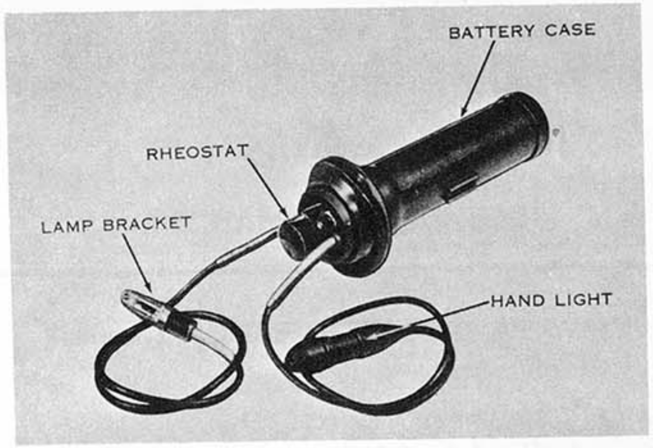
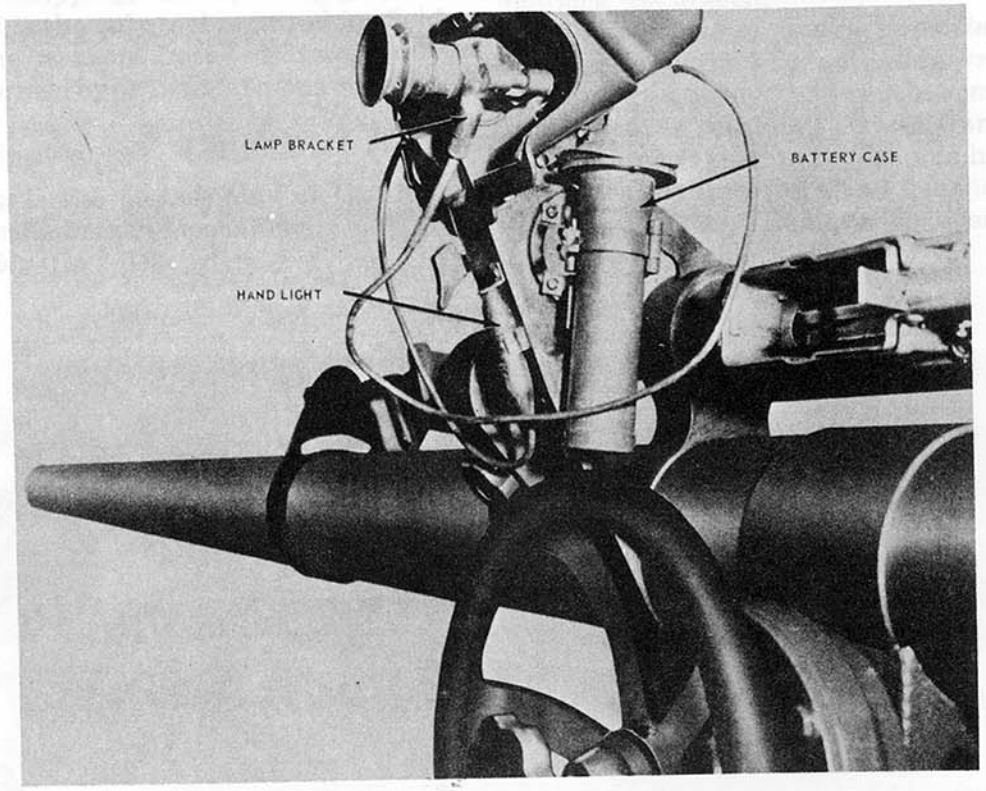


Figure 1–14. Reticle pattern (M92D and M92F elbow telescopes).



1. Instrument light.

Figure 1–15. Instrument light, M42.



2. Mounted on sight bracket of 106-mm recoilless rifle.

Figure 1–15—Continued.

CHAPTER 2

MECHANICAL TRAINING

Section I. DISASSEMBLY AND ASSEMBLY

2–1. General

Disassembly of the 106-mm recoilless rifle is limited to that necessary for ordinary care and cleaning (field stripping). The spotting gun adjusting wrench is the only tool required for field stripping of the weapon. Detailed disassembly should be performed by ordnance troops only.

2–2. Field Stripping

Field stripping is the disassembly of the 106-mm recoilless rifle breech mechanism.

a. Disassembly (fig 2–1).

(1) *Opening the breech.* Open the breech by depressing the breech operating lever and rotating it clockwise 180 degrees. Examine the chamber to be certain the rifle is clear. Close, but do not lock the breech.

(2) *Removal of breech operating lever assembly.* Using the 3/16-inch Allen wrench on the spotting gun adjusting wrench, remove the operating lever retaining screws from the hinge block. Support the hinge with one hand and lift the operating lever up about 2 inches. Take out the Woodruff key. Remove the operating lever from the hinge block.

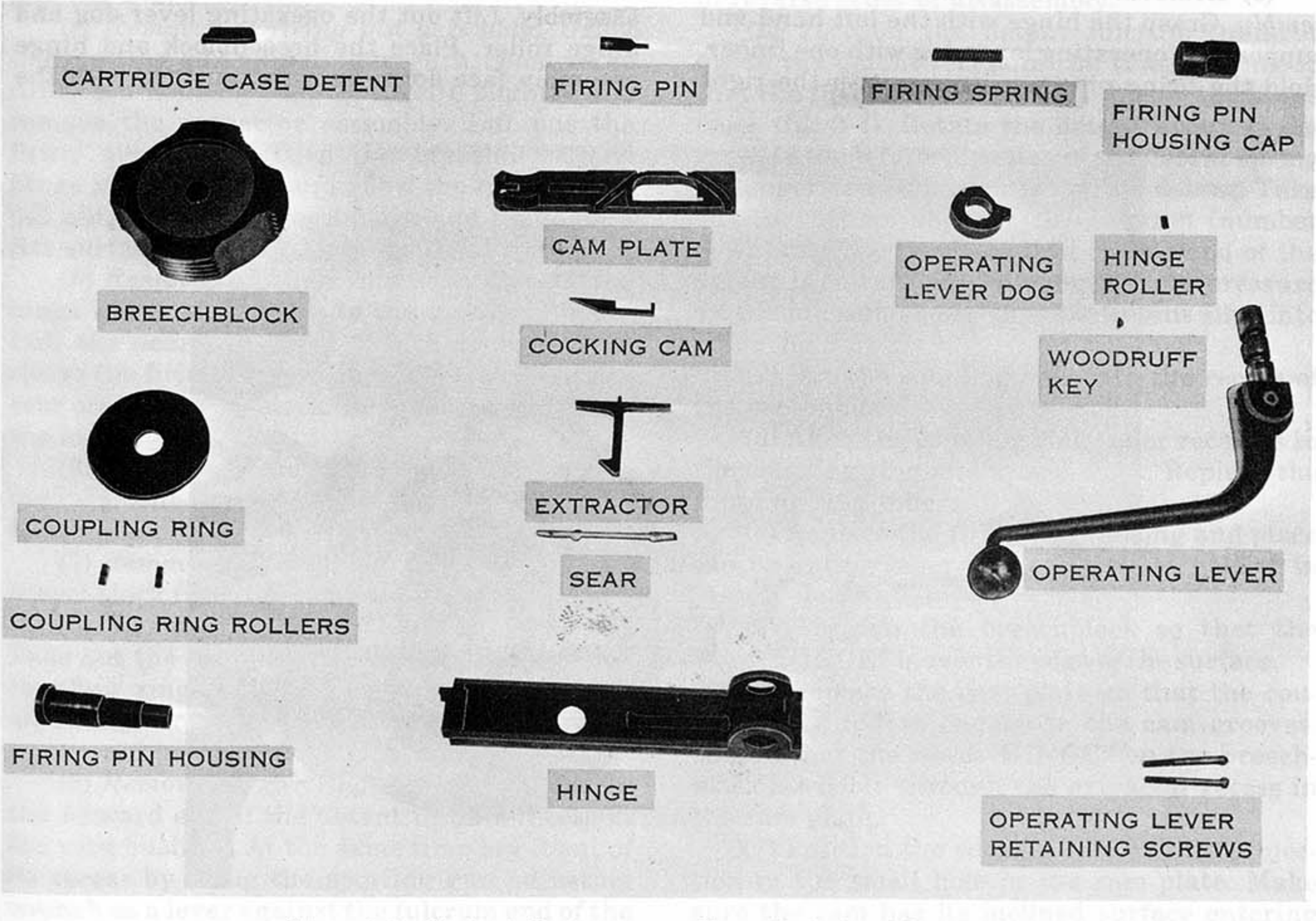


Figure 2–1. Parts of the 106-mm recoilless rifle during field stripping.

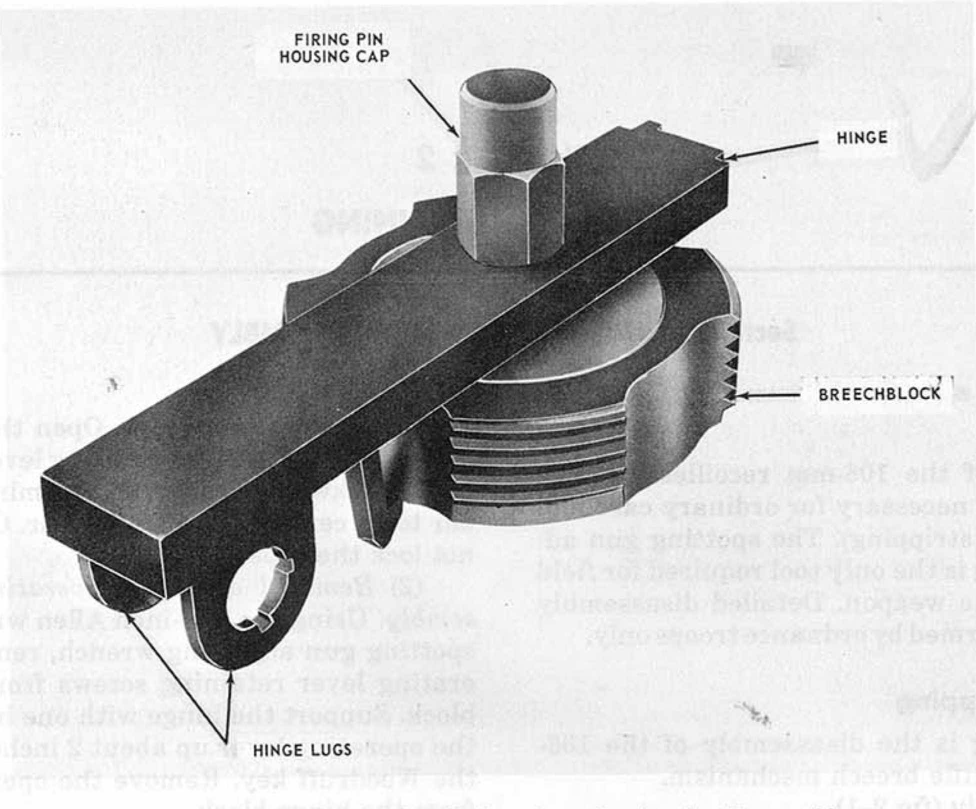


Figure 2–2. Positioning the breech mechanism for disassembly.

(3) *Removal of breechblock and hinge assembly.* Grasp the hinge with the left hand and support the operating lever dog with one finger. Hold the firing pin housing cap with the right hand and remove the breechblock and hinge assembly. Lift out the operating lever dog and hinge roller. Place the breechblock and hinge assembly face down on a flat surface with the extractor protruding over the edge of the surface (fig 2–2).

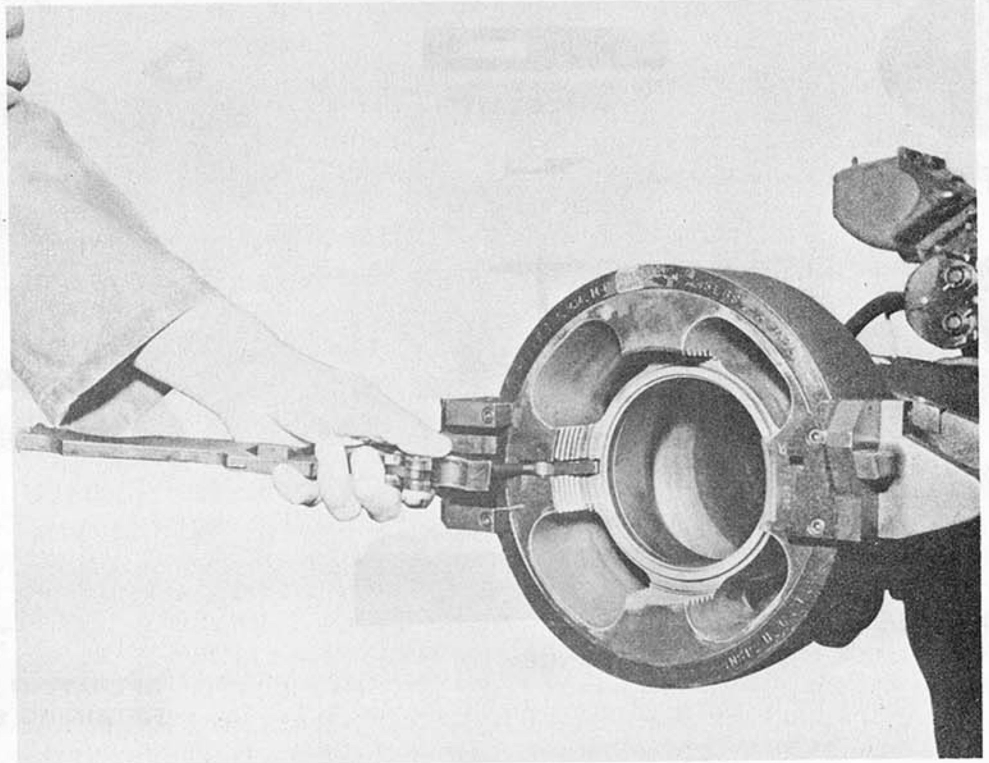


Figure 2–3. Removing the cartridge case detent.

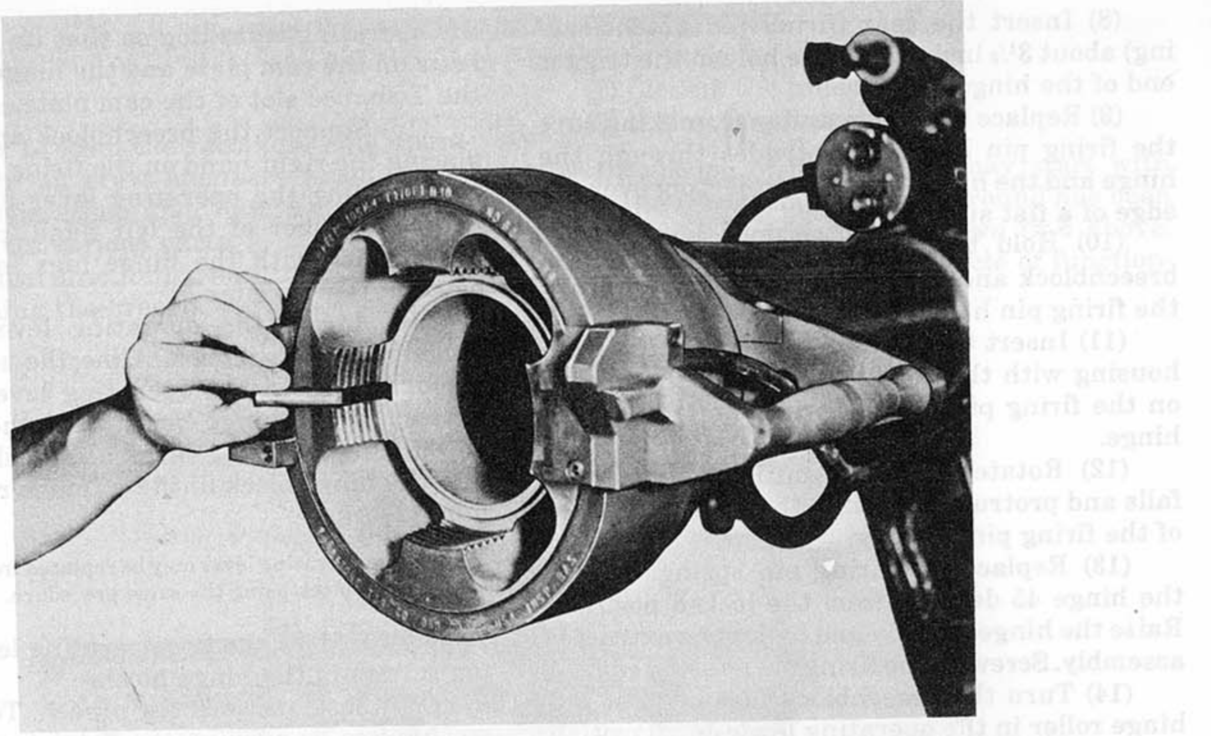


Figure 2–4. Positioning the cartridge case detent fulcrum.

(4) *Removal of firing pin assembly.* Using the spotting gun adjusting wrench, remove the firing pin housing cap; then raise slightly and remove the extractor assembly. Lift out the firing pin spring. Turn the breechblock and hinge assembly over and allow the firing pin to fall out. Place the breechblock and hinge on a flat surface.

(5) *Removal of hinge and sear.* Rotate the hinge about 45 degrees to the locked position. Pull the sear out about 2 inches, or until it clears the firing pin housing. Lift the hinge and sear off the breechblock. Remove the sear from the hinge.

(6) *Removal of cam plate.* Remove the cocking cam. Lift the cam plate from the firing pin housing and breechblock assembly.

(7) *Removal of firing pin housing.* Lift the breechblock from the firing pin housing.

(8) *Removal of coupling ring assembly.* Take out the coupling ring rollers. Remove the coupling ring by inserting the spotting gun adjusting wrench into a coupling ring roller recess and prying out.

(9) *Removal of cartridge case detent.* Press the forward end of the detent into its recess in the vent bushing. At the same time pry it out of its recess by using the spotting gun adjusting wrench as a lever against the fulcrum end of the detent (fig 2–3).

b. Assembly. Assemble the breech mechanism in reverse order of disassembly.

(1) Position the detent fulcrum (number up) in the detent recess in the vent bushing so that the tip end of the detent is facing the hinge block (fig 2–4). Rotate the detent about 45 degrees to the left until action of the detent spring no longer causes movement of the detent. Take out the detent and put the fulcrum (number down) into the recess so that the tip end of the detent is toward the chamber. Apply pressure on the fulcrum end so that the detent slips into place (fig 2–5).

(2) Put the coupling ring into the recess of the breechblock.

(3) Aline the coupling ring roller recesses in the coupling ring and breechblock. Replace the coupling ring rollers.

(4) Replace the firing pin housing and place the operating lever dog under it to hold it in place.

(5) Position the breechblock so that the word "HINGE" is over the edge of the surface.

(6) Replace the cam plate so that the coupling ring rollers engage in the cam grooves. Insure that the word "HINGE" on the breechblock is visible through the extractor recess in the cam plate.

(7) Position the cocking cam and its projection in the small hole in the cam plate. Make sure the cam has its inclined surface entering the rectangular hole in the firing pin housing.

(8) Insert the sear (firing pin notch leading) about 3½ inches into the hole in the trigger end of the hinge.

(9) Replace the hinge and sear, making sure the firing pin housing protrudes through the hinge and the hinge lugs are projecting over the edge of a flat surface.

(10) Hold the hinge ¼-inch up from the breechblock and slide the sear into the hole of the firing pin housing.

(11) Insert the firing pin into the firing pin housing with the point leading and the groove on the firing pin parallel with the long end of hinge.

(12) Rotate the sear until the firing pin falls and protrudes through the hole in the face of the firing pin housing.

(13) Replace the firing pin spring. Rotate the hinge 45 degrees from the locked position. Raise the hinge slightly and insert the extractor assembly. Screw on the firing pin housing cap.

(14) Turn the breechblock face up. Put the hinge roller in the operating lever dog. Position the operating lever dog so that its flat surface rests on the cam plate and the hinge roller is in the T-shaped slot of the cam plate.

(15) Support the breechblock and hinge by placing the right hand on the firing pin housing cap. Holding the operating lever dog in place with one finger of the left hand, position the breechblock with the hinge lugs in the hinge block.

(16) Insert the operating lever into the hinge about 1½ inches. Aline the sear for the Woodruff key in the operating lever with the keyway in the hinge block. Seat the Woodruff key in the operating lever and push the lever into the hinge block until its flange rests on the hinge block.

Note. The operating lever may be replaced from the bottom of the hinge block using the same procedure.

(17) Replace the two operating lever retaining screws in the hinge block.

(18) Close and lock the breech. Test fire the mechanism by pushing the firing knob.

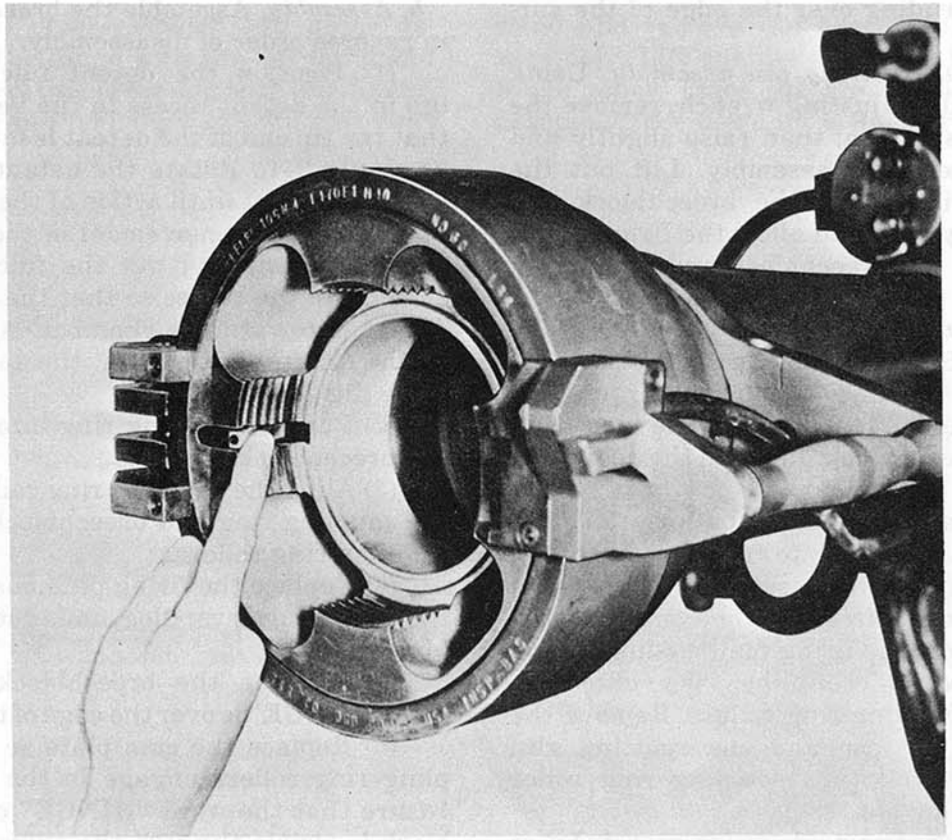


Figure 2–5. Replacing the cartridge case detent in its recess.

Section II. MECHANICAL FUNCTIONING

2–3. General

a. In order to keep the recoilless rifle operating properly all crew members must understand the operation and functioning of the weapon and its various parts.

b. Mechanical functioning has three phases.

(1) Opening the breech.

(2) Closing the breech.

(3) Firing the piece.

c. Discussion of functioning may start with any of the three phases. When a round has been fired, phases then occur as shown in *b* above. This represents one complete cycle of functioning.

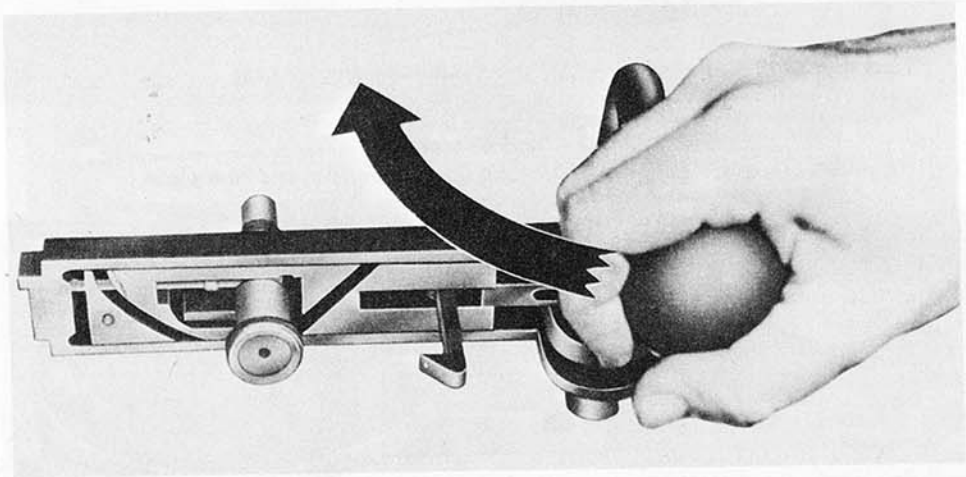


Figure 2–6. Unlocking the breech mechanism.

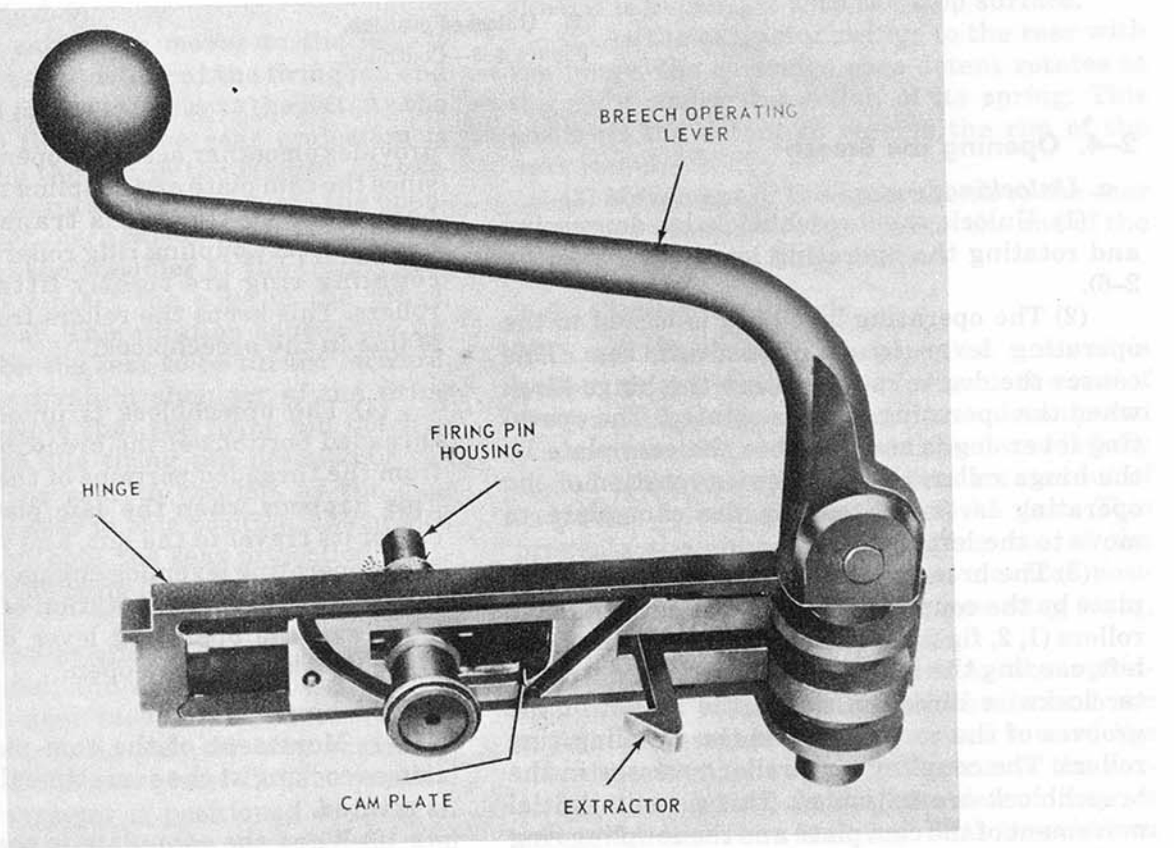
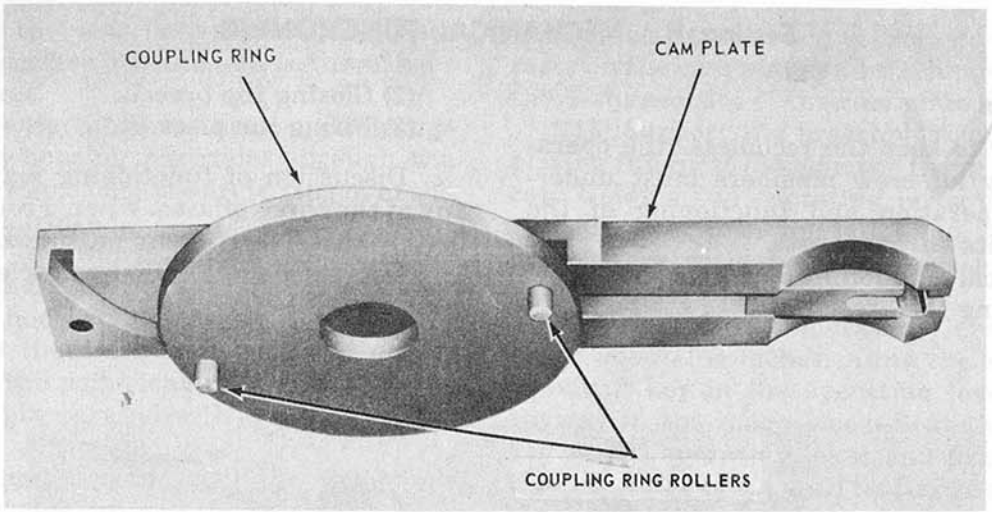
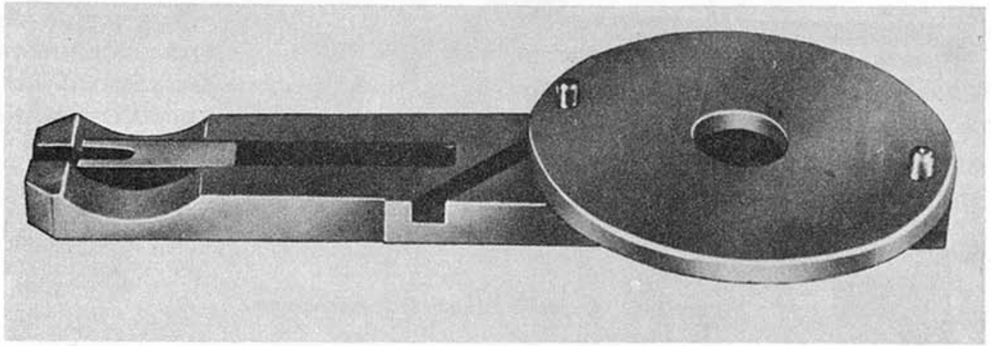


Figure 2–7. Breech mechanism (unlocked position).



1. Locked position.
Figure 2–8. Coupling ring, coupling ring rollers, and cam plate.



2. Unlocked position.
Figure 2–8—Continued.

2–4. Opening the Breech

a. Unlocking.

(1) Unlock the breechblock by depressing and rotating the operating lever clockwise (fig 2–6).

(2) The operating lever dog is locked to the operating lever by the Woodruff key. This causes the dog to rotate within the hinge block when the operating lever is rotated. The operating lever dog is connected to the cam plate by the hinge roller; thus, clockwise rotation of the operating lever dog causes the cam plate to move to the left (fig 2–7).

(3) The breechblock is connected to the cam plate by the coupling ring and two coupling ring rollers (1, 2, fig 2–8). The cam plate moves to the left, causing the breechblock to rotate in a counterclockwise direction under the action of the grooves of the cam plate and the coupling ring rollers. The coupling ring roller recesses in the breechblock are extended. This permits initial movement of the cam plate and the coupling ring without movement of the breechblock. It also provides smoother action in opening the breech, since the cam plate and coupling ring are moving before the movement is transmitted to the breechblock. Coupling ring roller recesses in the coupling ring are tightly fitted around the rollers. This keeps the rollers from slipping out of line in the breechblock.

(4) The breechblock is unlocked when the threaded portions of the breechblock disengage from the threaded portions of the vent bushing. This happens when the cam plate reaches the end of its travel to the left, and the flat surface of the operating lever dog engages the face of the cam plate. Continued rotation of the operating lever and the operating lever dog swings the breechblock and hinge open.

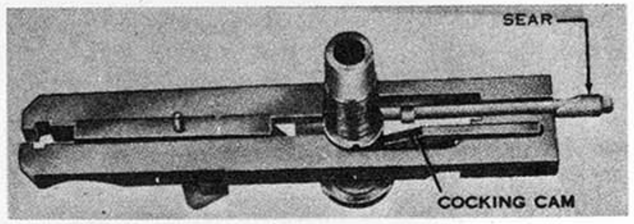
b. Cocking.

(1) Movement of the cam plate to the left causes cocking at the same time the breechblock is rotated.

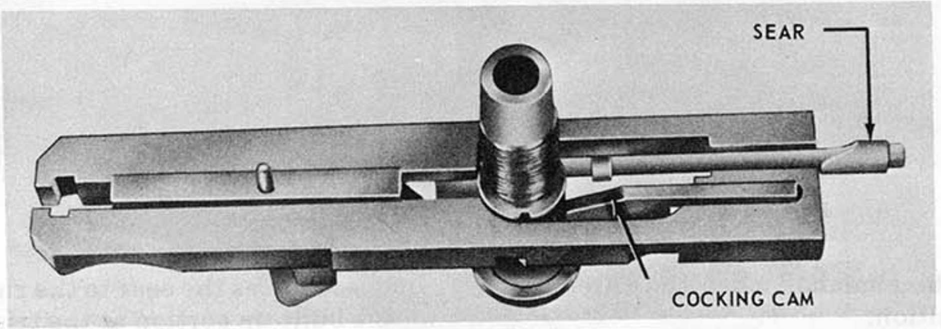
(2) When the cam plate is positioned to the right (locked position), the point of the cocking cam is engaged in the rectangular hole in the firing pin housing. It is not in contact with the firing pin (1, fig 2–9).

(3) The square end of the cocking cam is seated in a small hole in the cam plate, causing the cocking cam to be locked to the cam plate. Rotation of the operating lever dog moves the cam plate.

(4) As the cam plate moves to the left (unlocked position), the cocking cam moves with it. The inclined surface of the cocking cam enters the rectangular hole in the firing pin housing and comes in contact with the beveled shoulder on the firing pin. This contact cams the firing pin to the rear against the action of the firing pin spring (2, fig 2–9).



1. Locked position.
Figure 2–9. Position of the cocking cam.



2. Unlocked position.
Figure 2–9—Continued.

(5) As the cam plate moves to the left, it contacts the small shoulder at the firing pin end of the sear and moves the sear to the left. As the sear moves to the left, the sear projection is withdrawn from the slot in the trigger, permitting the hinge to rotate and complete the opening of the breech mechanism. It also causes the cam surface on the shoulder at the trigger end of the sear to contact the edge of the hinge, rotating the sear. This rotation causes the firing pin notch on the sear to be turned forward, away from the straight shoulder of the firing pin (fig 2–10). Note that the firing pin notch is not alined with the firing pin because of the movement of the sear to the left by the cam plate. With the sear in this position, the breech can be closed without the sear projection striking the trigger housing (fig 2–10).

c. Extraction.

(1) When movement of the cam plate to the left is completed, the action of the extractor spring and plunger moves the left end of the extractor forward and past the stop surface of the long slot of the cam plate. In this way, the hook of the extractor is positioned in front of the rim of the case. As the breechblock and hinge mechanism swing to the rear, the extractor pulls the round partially from the chamber. With further rotation of the hinge, the extractor disengages its hook from the rim of the case. The left end of the extractor prevents rotation of the breechblock when it is in the open position, since it is in contact with the stop surface.

(2) As the extractor swings to the rear with the hinge, the cartridge case detent rotates to the right under the action of its spring. This positions the detent to receive the rim of the next round.

(3) Movement of the breechblock to the rear is stopped when the hinge stop on the end of the hinge contacts the hinge block.

2–5. Closing the Breech

With the breech open, assume that a round is loaded. As the round moves forward, the rim of the cartridge case contacts the detent and pushes it into its recess. When the round is fully seated in the chamber, the detent rotates out of its recess to engage the rim of the case. This prevents the round from slipping out of the chamber when the rifle is in an elevated position. As the loader rotates the operating lever, the following actions take place:

a. Positioning the Extractor. As the operating lever is rotated counterclockwise and the breech mechanism swings forward toward the closed position, the extractor contacts the cartridge case detent, forcing the detent into its recess in the vent bushing. The breechblock (nearly closed) now prevents the round from

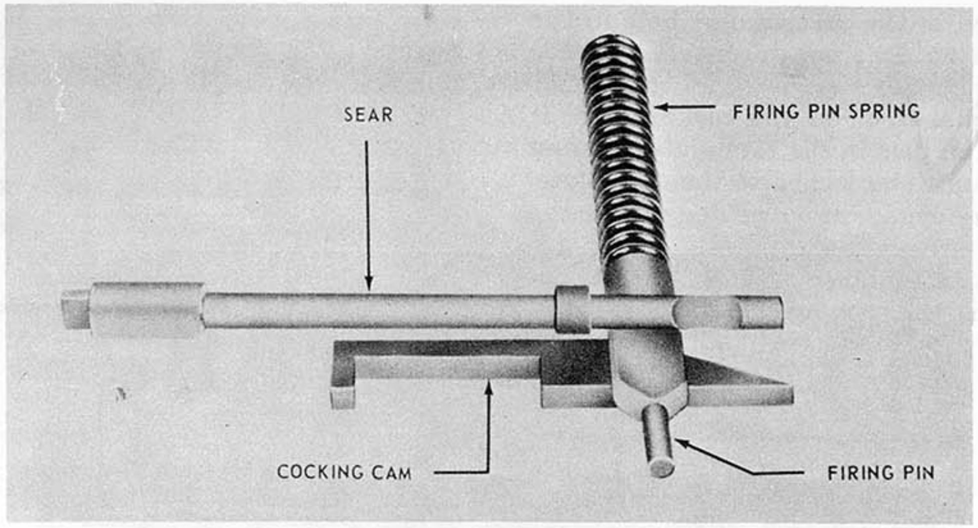


Figure 2–10. Firing pin and sear, front view (unlocked position).

sliding out of the chamber when the rifle is in an elevated position.

(1) Continued movement of the breech mechanism into the vent bushing causes the hook of the extractor to contact the rim of the case. (If there is no round in the chamber, the hook of the extractor contacts the vent bushing). This cams the left end of the extractor to the rear against the action of the extractor spring and plunger and prepares the hook of the extractor to slip over the rim of the case.

(2) Further movement of the breech mechanism into the vent bushing causes the left end of the extractor to move to the rear into the long slot of the cam plate. This movement occurs because of the camming action of the vent bushing on the hook of the extractor. It causes the left end of the extractor to break contact with the stop surface of the long slot in the cam plate. The cam plate is now free to move to the right.

b. Locking. The breech is now closed but not locked. Continued rotation of the operating lever in a counterclockwise direction causes the operating lever dog to rotate. This movement is transmitted to the cam plate by the hinge rollers. The cam plate moves to the right, causing the breechblock to rotate clockwise under the action of the cam grooves of the cam plate and the coupling ring rollers. Threaded portions of the breechblock become engaged with threaded portions of the vent bushing, locking the breechblock.

c. Positioning the Firing Mechanism. Movement of the cam plate to the right, after the breechblock has entered the vent bushing, positions the firing mechanism. The cocking cam is moved to the right and out of contact with the firing pin. The firing pin moves forward slightly and comes in contact with the sear. The cam plate forces the sear to the right by contacting the built-up portion at the trigger end of the sear. This alines the curved firing pin notch of the sear with the firing pin. This notch is not in contact with the firing pin because the sear was rotated when the breech was opened. As the sear moves to the right, the projection on the end of the sear enters the slot in the trigger. The firing mechanism is now positioned to fire the piece.

2–6. Firing the Piece

Firing the piece includes two phases—action of the firing mechanism and action of the gases.

a. Action of Firing Mechanism. Pushing the firing knob on the elevating mechanism causes a key in the top of the mount transfer box to rotate. This key is engaged in the slot of the large firing cable lever in the rifle transfer box. In this way, movement of the firing knob is transferred to the firing cable levers. Movement of the firing knob causes movement of the firing cable. The trigger end of the firing cable is engaged in the claws of the trigger. Movement of the firing cable causes rotation of the trigger. This rotates the sear because the sear projection is engaged in the slot of the trigger. Rotation of the sear turns the curved notch toward the firing pin. This permits the firing pin to move forward under pressure of the firing pin spring. The firing pin strikes the primer in the cartridge case, igniting the propellant charge. The firing mechanism employs a positive sear return principle. The sear and firing mechanism are returned to the proper position when the breech is opened. This system does not rely on a spring but on the more positive action of the cam plate, sear, and cocking cam (para 2–4).

b. Action of the Gas. When the propellant powder is ignited, it turns into a mass of hot

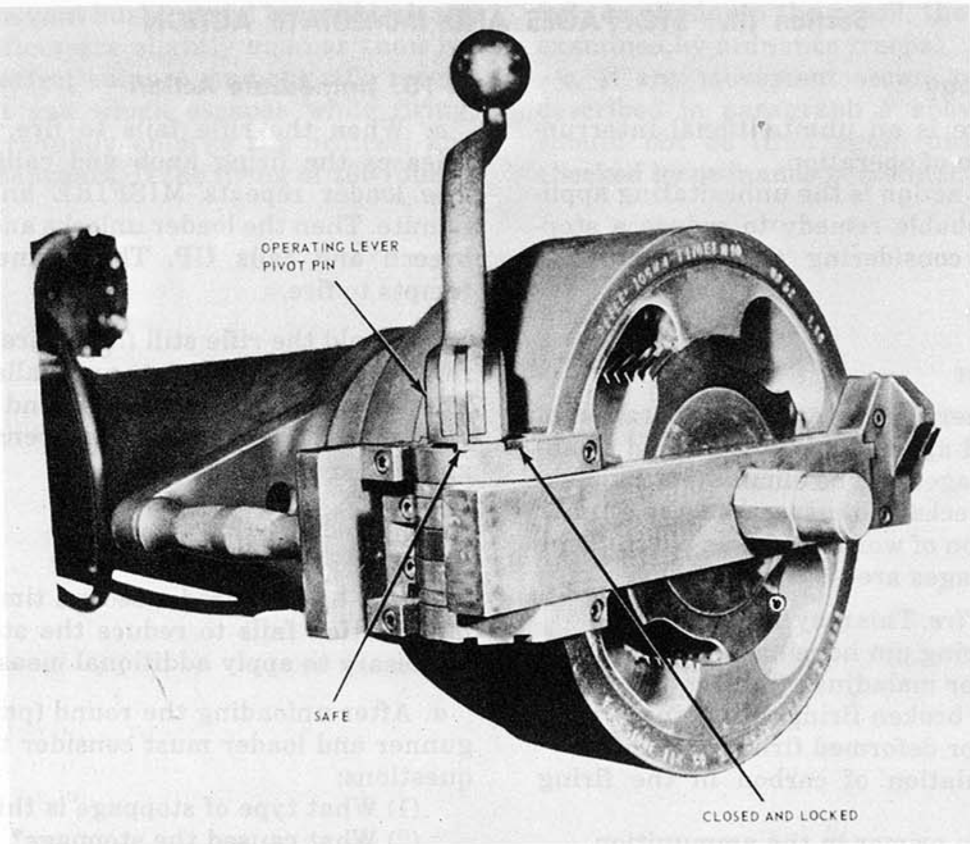


Figure.2–11. Loader's safety (breech in SAFE position).

gas that expands rapidly and exerts equal force in all directions. In a conventional weapon, this action exerts force to the rear, causing the weapon to move to the rear, or recoil. In a recoilless rifle, this rearward force is neutralized because a portion of the hot, expanding gas escapes to the rear through openings in the breechblock. Since the gas expands with equal force in all directions, a portion of the force is expended in forcing the projectile forward through the tube. In this same manner the gas exerts force against the rear of the cartridge case. The remainder of the gas burns and blows its way through the perforations in the cartridge case. This portion of the gas expands into the enlarged reaction chamber and exerts a force to the rear against the vent bushing and portions of the breechblock. By allowing a portion of this gas to escape to the rear, the remaining force exerted by the gas is neutralized, and the weapon remains motionless when fired (fig 1–2).

2–7. Safety Features

Training in mechanical functioning should include instruction in the safety features discussed below.

a. The loader's safety is controlled by the operating lever, which locks the breech while it is either in the closed or SAFE position (fig 2–11). The operating lever pivots on a pin at the top of the operating lever shaft. The action of a spring and ball within the operating lever normally holds the lever in a raised position. This tends to force the lock cam of the operating lever into one of the two lock slots on the hinge block. Rotating the operating lever places the lock cam above one of the lock slots on the hinge. The hinge cam then engages the slot and the breech mechanism cannot be moved until downward pressure is applied to the handle of the operating lever. The two lock slots are positioned to lock the breech either in the fully closed and locked position or in the SAFE position with the breech closed but not fully locked. With the breech in the SAFE position, the rifle cannot be fired.

b. The traversing mechanism is protected by an overriding clutch. This clutch permits the traversing mechanism to slip without damage if a sudden lateral force is applied to the rifle.

c. The Woodruff key of the operating lever is undersized so that it will shear if the operating lever is suddenly struck by excessive force. This protects the remainder of the breech mechanism from damage. Replacement keys are kept in the ball handle of the operating lever.

Section III. STOPPAGES AND IMMEDIATE ACTION

2–8. Terminology

a. A stoppage is an unintentional interruption of the cycle of operation.

b. Immediate action is the unhesitating application of a probable remedy to reduce a stoppage without considering the cause of the stoppage.

2–9. Stoppages

When the gunner understands the operation of his weapon and applies normal care and cleaning, most stoppages will be eliminated. By making frequent checks and inspections the gunner insures detection of worn or broken parts. Some causes of stoppages are—

a. Failure to Fire. This may be caused by—

(1) Loose firing pin housing cap.
(2) Broken or maladjusted firing cable.
(3) Weak or broken firing pin spring.
(4) Broken or deformed firing pin.
(5) Accumulation of carbon in the firing mechanism.
(6) Defective primer in the ammunition.
(7) Broken sear projection.

b. Failure to cock. This may be caused by—

(1) Broken or deformed cocking cam.
(2) Broken or deformed sear that cannot hold the firing pin in the cocked position.
(3) Accumulated dirt causing the cam plate and hinge to freeze together.

c. Failure to Extract. This may be caused by—

(1) Missing extractor plunger.
(2) Broken extractor.
(3) Weak or broken extractor spring.
(4) Deformed cartridge case.

d. Failure of Breech To Lock or Unlock. This may be caused by—

(1) Loose firing pin housing cap.
(2) Weak trigger return spring.
(3) Broken or missing Woodruff key.
(4) Missing hinge roller.
(5) Missing coupling ring rollers.
(6) Broken or burred interrupted threads on the breechblock or vent bushing.
(7) Accumulated dirt in the cam grooves of the cam plate.

e. Failure to Load. This may be caused by—

(1) Dirt, unburned propellant powder, or pieces of cartridge case liner accumulated in the lands and grooves near the chamber.
(2) Burred or deformed pre-engaged rotating band.

2–10. Immediate Action

a. When the rifle fails to fire, the gunner releases the firing knob and calls MISFIRE. The loader repeats MISFIRE and waits *one* minute. Then the loader unlocks and relocks the breech and calls UP. The gunner again attempts to fire.

b. Should the rifle still fail to fire, the gunner releases the firing knob and calls MISFIRE. The loader repeats MISFIRE and again waits *one* minute. Then the loader opens the breech and unloads the rifle.

2–11. Reduction of Stoppages

If a rifle has misfired a second time and immediate action fails to reduce the stoppage, it is necessary to apply additional measures.

a. After unloading the round (para 6–25), the gunner and loader must consider the following questions:

(1) What type of stoppage is this?
(2) What caused the stoppage?
(3) What parts failed to function?
(4) What corrective action should be taken?

b. Check the primer of the round for an indentation from the firing pin. If an indentation is present, the cause of the misfire is in the round and it must be destroyed by EOD troops or according to unit SOP. If the primer is not indented, examine the rifle to determine the cause of the malfunction.

Note. Handle all misfired rounds carefully. It is relatively safe to transport such rounds for a short distance, if the round has been adequately cushioned to reduce any shock which could accidentally detonate the round.

2–12. Malfunctions and Restoration of Balance

a. When a recoilless weapon functions properly, it does not move when fired. The forces acting on the rifle neutralize each other and the rifle is balanced. When an improper amount of gas escapes to the rear, the rifle develops one of two malfunctions characteristic of recoilless weapons.

(1) If too much gas escapes to the rear, forward thrust on the rifle is too great. Forward movement results.

(2) If too little gas escapes to the rear, forward thrust is insufficient. Rearward movement results.

b. When the vent bushing and breechblock are new, the orifices are slightly smaller than required for perfect balance, and the rifle recoils slightly. Hot gas which escapes while firing, erode and gradually enlarge the orifices; and the recoil disappears. If the firing of 100 rounds fails to eliminate the recoil, the rifle should be examined by ordnance troops.

c. If any movement occurs other than that described in paragraph *b* above, the weapon should not be fired again until it has been checked by ordnance personnel.

CHAPTER 3

MECHANICAL TRAINING, CALIBER .50 SPOTTING GUN, M8C

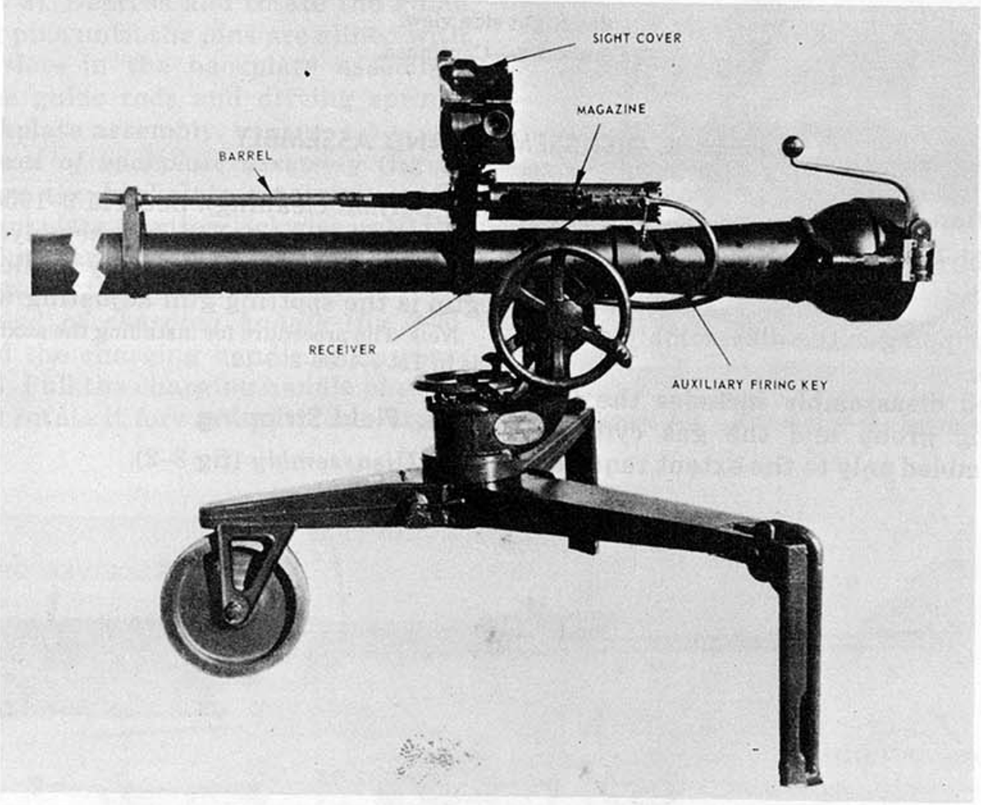
Section I. GENERAL DESCRIPTION

3–1. Introduction

The caliber .50 spotting gun is a semiautomatic, gas-operated, magazine-fed gun (1, 2, fig 3–1). It assists the gunner in *determining* range and leads to the target. It is attached to the 106-mm recoilless rifle by two mounting brackets.

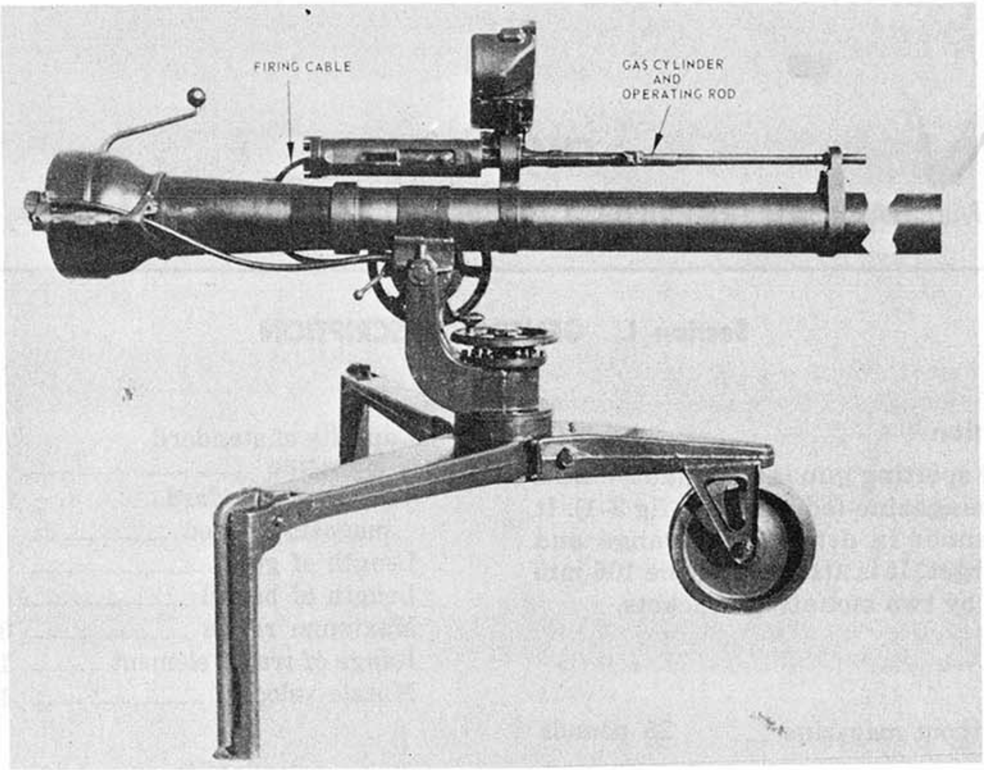
3–2. Data

Weight without magazine	25 pounds
Capacity of standard magazine	20 rounds
Weight of standard magazine loaded	10 pounds
Length of gun	44 inches
Length of barrel	32 inches
Maximum range	3,100 meters
Range of tracer element	1,500 meters
Muzzle velocity	1,700 ft per second



1. Left side view.

Figure 3–1. Caliber .50 spotting gun, M8C.



2. Right side view.
Figure 3-1—Continued.

Section II. DISASSEMBLY AND ASSEMBLY

3-3. Introduction

a. Disassembly of the spotting gun has two phases:

(1) Field stripping is the disassembly of the receiver group.

(2) Detailed disassembly includes the fire control housing group and the gas cylinder group (disassembled only to the extent required for normal cleaning). See TM 9-1000-205-12 for procedures in detailed disassembly.

b. The only tool necessary to field strip the gun is the spotting gun adjusting wrench.

Note. The procedure for installing the auxiliary firing key is in TM 9-1000-205-12.

3-4. Field Stripping

a. Disassembly (fig 3-2).

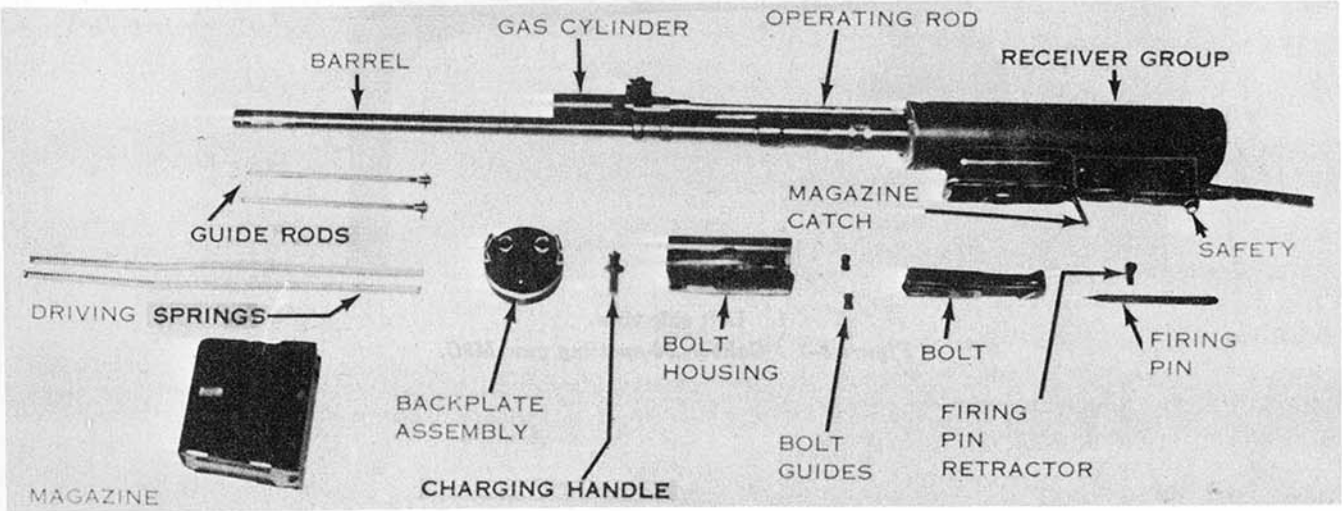


Figure 3-2. Parts of the caliber .50 spotting gun disassembled during field stripping.

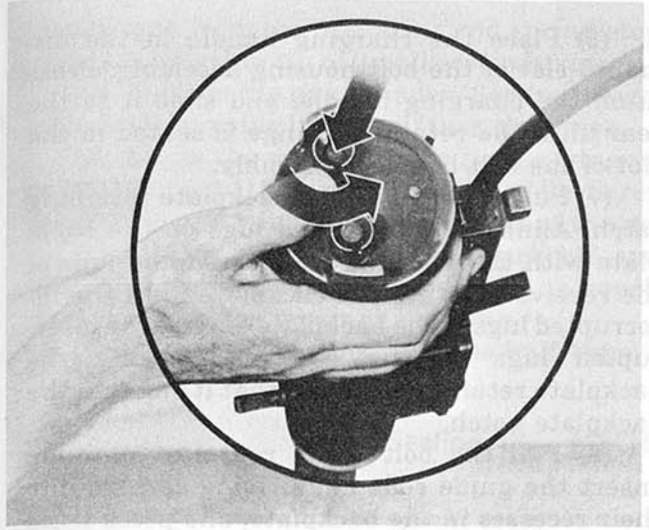


Figure 3-3. Depressing and rotating the guide rod retaining pin.

(1) *Removal of magazine.* Press the magazine release lever forward and withdraw the magazine.

(2) *Removal of guide rods and driving springs* (fig 3-3). Depress and rotate the guide rod retaining pins until the pins are alined with the release slots in the backplate assembly. Withdraw the guide rods and driving springs from the backplate assembly.

(3) *Removal of backplate assembly* (fig 3-4). Pull out on the backplate retaining catch. Rotate the backplate counterclockwise until the interrupted lugs are disengaged from the receiver and remove the backplate.

(4) *Removal of charging handle* (fig 3-5). Pull and hold the charging handle in its rearmost position. Pull the charging handle plunger outward, and rotate it forward until the retaining flange is alined with the dismount slot in the bolt housing assembly. Remove the charging handle.

(5) *Removal of bolt housing assembly.* Remove the bolt housing assembly by pushing it to the rear. As the bolt housing assembly slides out of the receiver, grasp it to prevent loss of the bolt guides.

(6) *Removal of bolt guides.* Remove the bolt guides from the bolt housing assembly.

(7) *Removal of bolt assembly* (fig 3-6). Hold the bolt housing assembly bolt-side up. Remove the bolt assembly by lifting it upward while sliding it to the rear.

(8) *Removal of firing pin retractor and firing pin.* Remove the firing pin retractor and the firing pin from the bolt.

b. Assembly.

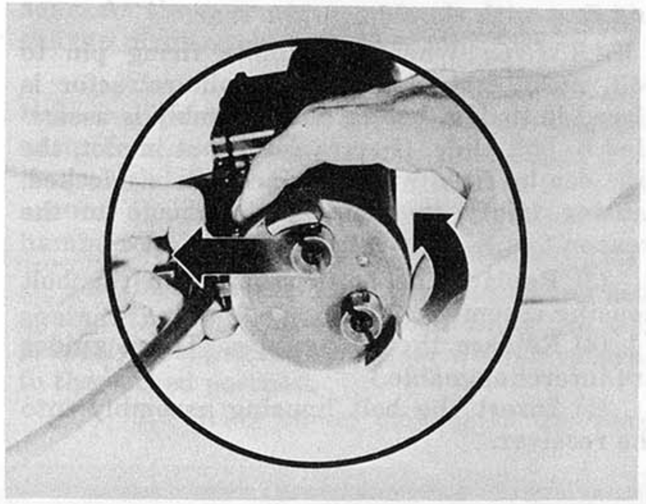


Figure 3-4. Removal of the baseplate assembly.

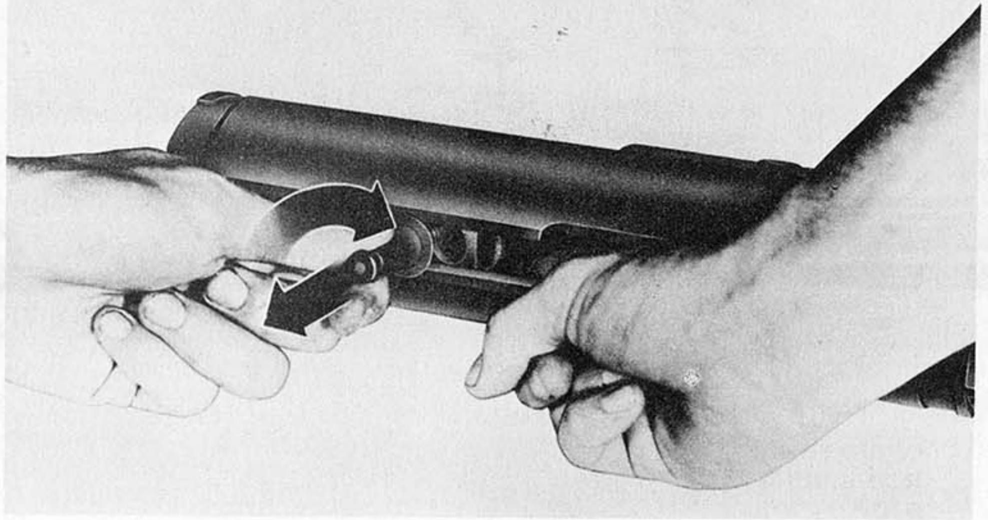


Figure 3-5. Removal of the charging handle.

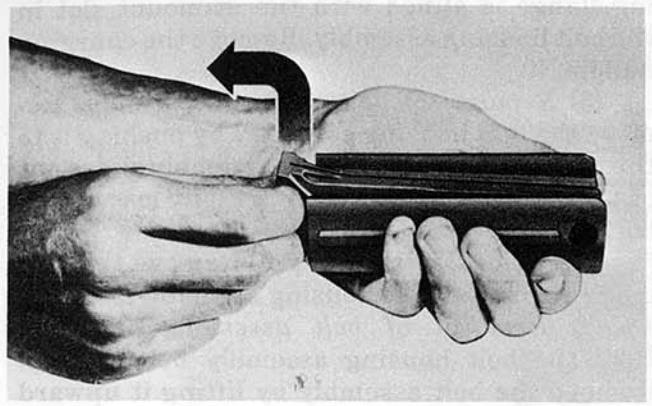


Figure 3–6. Removal of the bolt assembly from the bolt housing assembly.

(1) Replace the firing pin in the bolt. Aline the retractor hole in the firing pin with the retractor hole in the bolt.

(2) Replace the firing pin retractor, small end first with shoulder to the rear.

WARNING: **When assembling firing pin to bolt, make certain that firing pin retractor is placed in its slot before bolt assembly is assembled to bolt slide. If retractor is not in slot, the rifle can be fired with bolt incompletely locked, causing injury to troops and damage to the weapon.**

(3) Replace the bolt assembly in the bolt housing assembly.

(4) Replace the bolt guides. (These guides are interchangeable.)

(5) Insert the bolt housing assembly into the receiver.

(6) Place the charging handle in the dismount slot of the bolt housing assembly. Press in on the charging handle, and slide it to the rear until the retaining flange is seated in the slot of the bolt housing assembly.

(7) Pull outward on the backplate retaining catch. Aline the interrupted lugs on the backplate with the gaps on the interrupted lugs of the receiver. Rotate the backplate until the interrupted lugs of the backplate engage the interrupted lugs on the receiver. Release the backplate retaining catch so that it engages the backplate notch.

(8) Pull the bolt to its rearmost position. Insert the guide rods and driving springs into their recesses in the backplate, and press them forward as far as possible. Allow the bolt to go forward slowly. Seat the guide rod retaining pins by rotating the rods into their recesses in the backplate.

c. Disassembly of the Gas Operating Group (fig 3-7).

(1) Loosen the gas regulator needle wingnut and unscrew and remove the gas regulator needle from the gas cylinder block with a screwdriver.

(2) Turn the gas cylinder one-half turn counterclockwise. Remove the gas cylinder by pulling it toward the muzzle.

(3) Pull or push the operating rod away from gas cylinder block a sufficient distance to clean the gas piston.

d. Assembly of Gas Operating Group.

(1) If the operating rod spring becomes disengaged from the operating rod spring stop, reseat it by using tip of small screwdriver.

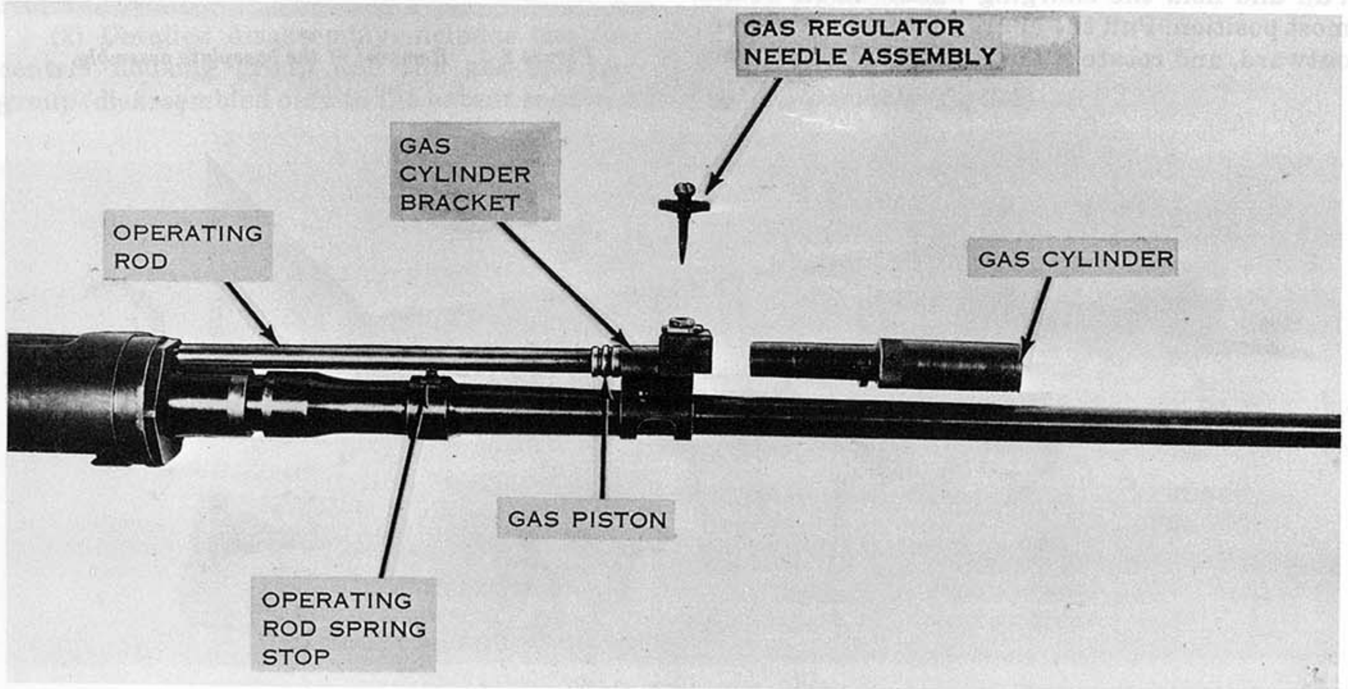


Figure 3–7. Disassembly of the gas operating group.

(2) Replace the gas cylinder. Secure the gas cylinder by turning it one-half turn clockwise.

(3) Screw the gas regulator needle wingnut completely onto the gas regulator needle. Screw the needle and wingnut into the port of the gas cylinder block until handtight. Back off one-half turn counterclockwise and lock the needle by tightening the wingnut.

(4) In some weapons, the one-half turn is not adequate because it does not provide enough gas. The indications of insufficient gas are the failure to strip a fresh round off the magazine, or the failure to eject an expended round. An indication of excess gas is the stubbing of the nose of a round against the forward wall of the receiver or the lip of the magazine. Insufficient gas is the more common of the two; but when either occurs, loosen the wingnut and rotate the needle counterclockwise for an increase or clockwise for a reduction of gas.

Section III. MECHANICAL FUNCTIONING

3–5. General

a. Crew members must understand the principles of operation and functioning of the spotting gun and its parts in order to keep it operating.

b. Mechanical functioning has three phases:

(1) Action of the firing control housing group.

(2) Rearward movement of the bolt.

(3) Forward movement of the bolt.

c. These three phases represent one complete cycle of functioning.

3–6. Action of Firing Control Housing Group

a. When the gunner wants to fire a caliber .50 spotting round, he pulls the firing knob on the M79 mount. The following actions (1, 2, fig 3-8) take place in the firing control housing group:

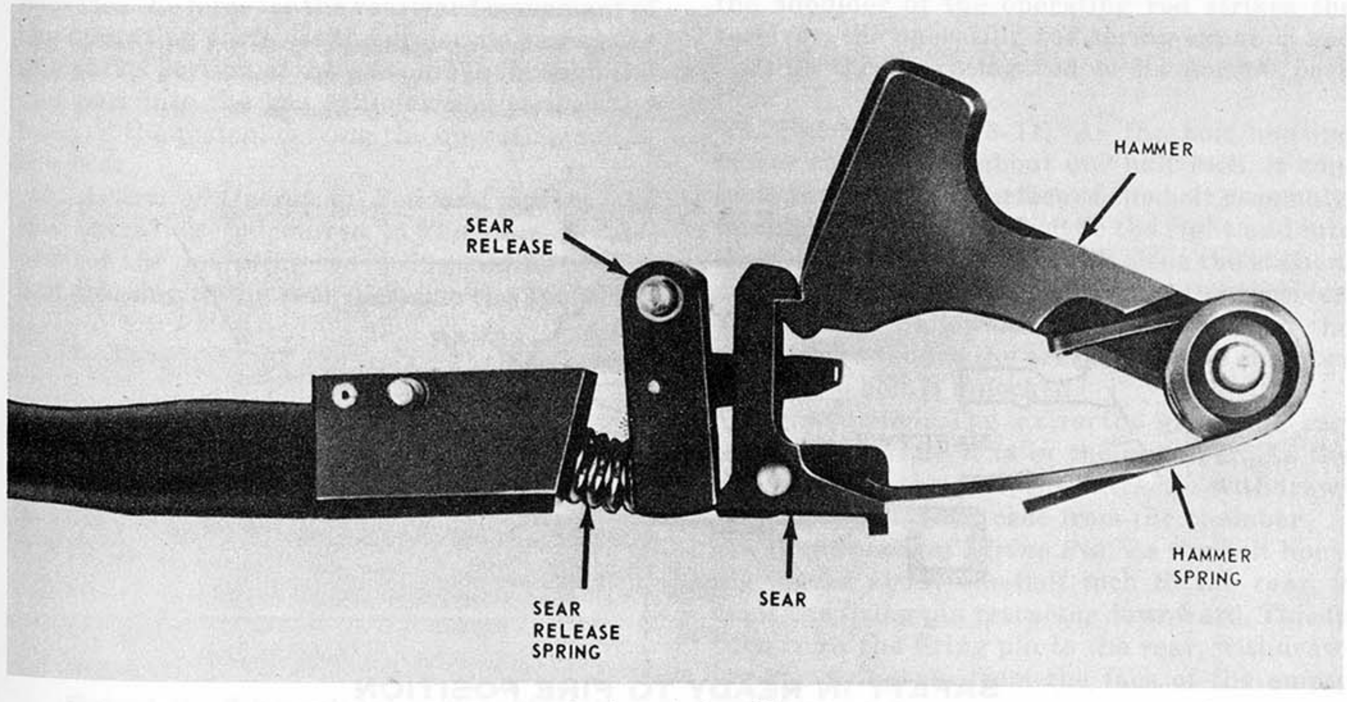
(1) The ball end of firing cable is seated in the notch in the sear release. As the firing cable moves to the rear, it causes the sear release to pivot around the sear release pin.

(2) The arm of the sear release engages the sear. As the sear release pivots, it causes the sear to pivot around the sear pin.

(3) When the hammer is in the cocked position, the sear notch on the hammer is engaged with the sear. The hammer is disengaged from the sear as the sear pivots. It is free to rotate around the hammer pin (under action of the hammer spring) and strike the firing pin.

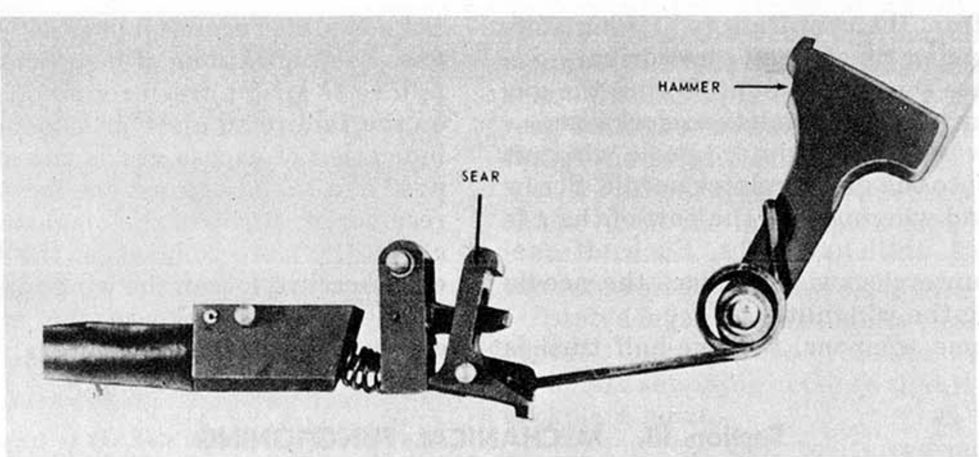
(4) The long end of the hammer spring acts against the lip of the sear, positioning the sear properly to engage the hammer when it returns to the cocked position.

(5) The firing cable, moving to the rear,



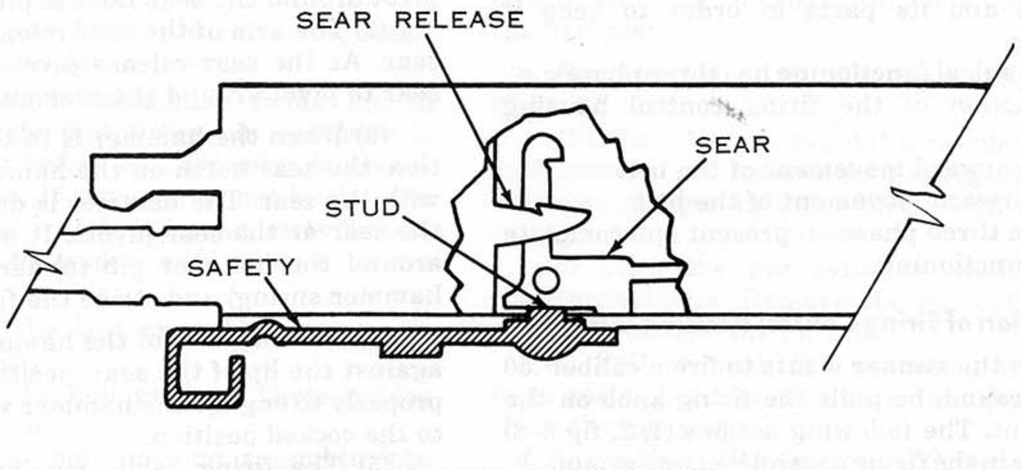
1. In cocked position.

Figure 3–8. Components of fire control housing group.

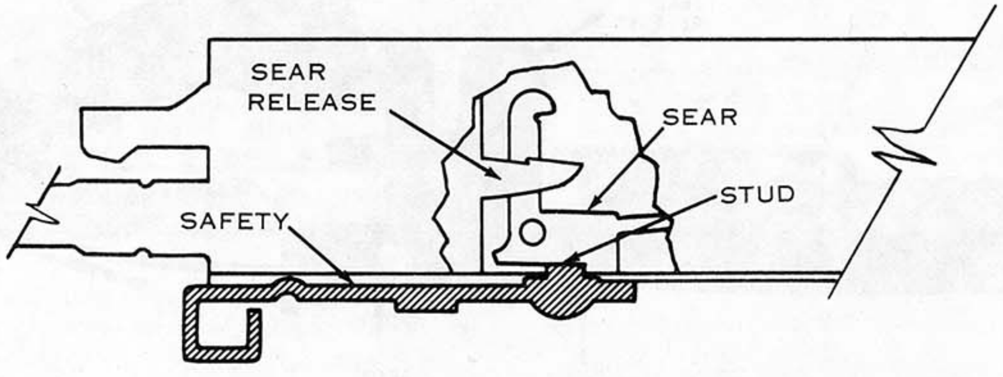


2. In fired position.

Figure 3-8—Continued.



SAFETY IN SAFE POSITION



SAFETY IN READY TO FIRE POSITION

Figure 3-9. Action of the safety (caliber .50 spotting gun).

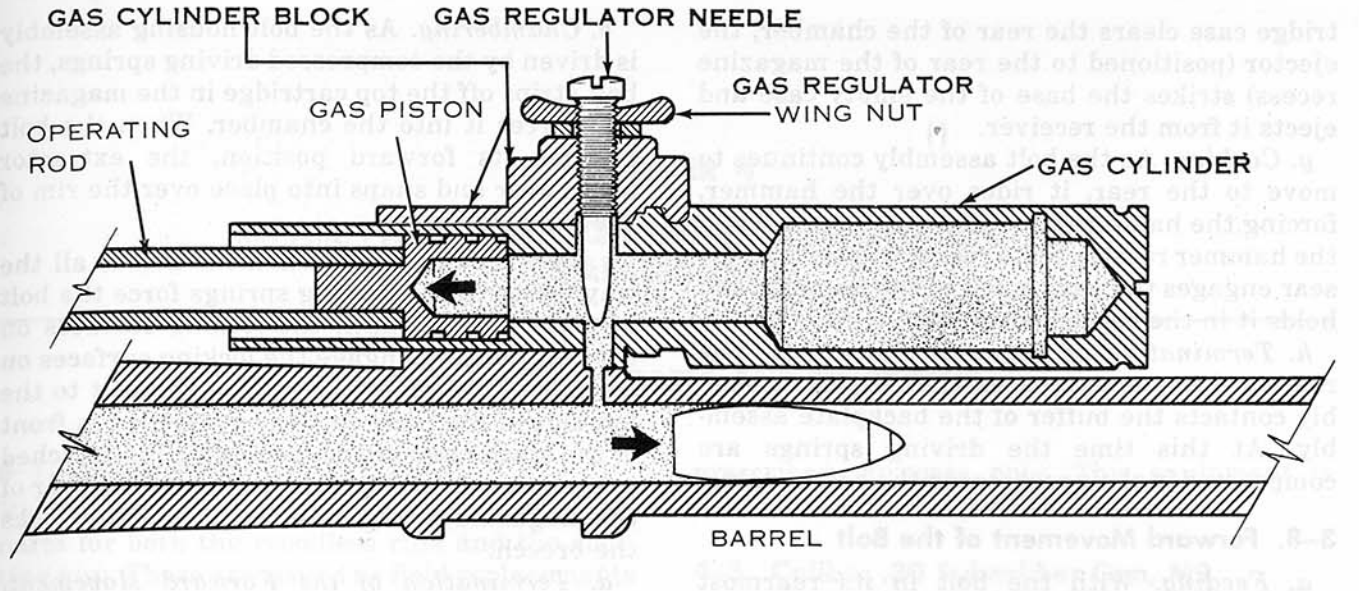


Figure 3-10. Action of the gas (caliber .50 spotting gun).

compresses the sear release spring bushing. The sear release spring expands and forces the sear release to engage the sear as tension on the firing cable is released.

b. When the safety is pulled out and to the rear, a stud moves under the sear (fig 3-9). This stud prevents the sear from rotating about the sear pin when the firing cable is pulled, actuating the firing mechanism. This in turn prevents disengagement of the sear from the hammer.

3-7. Rearward Movement of the Bolt

a. Action of the gas (fig 3-10). When a round is fired, the gas formed by the burning powder provides the force for the rearward movement of the operating parts. As the projectile passes the gas port a portion of the gas passes through the gas port into the gas cylinder and strikes the head of the piston, driving the operating rod to the rear.

b. Action of Operating Rod and Spring. As the operating rod moves to the rear it compresses the operating rod spring and forces the bolt housing to the rear (because the operating rod and the bolt housing are in contact). When the shoulder of the operating rod strikes the receiver, the operating rod spring expands and returns the operating rod to its normal position.

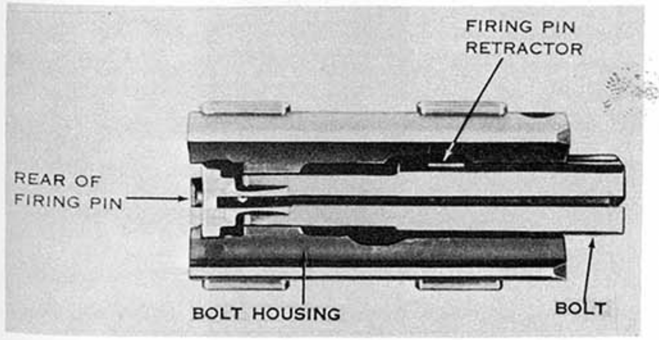


Figure 3-11. Bolt in unlocked position within bolt housing.

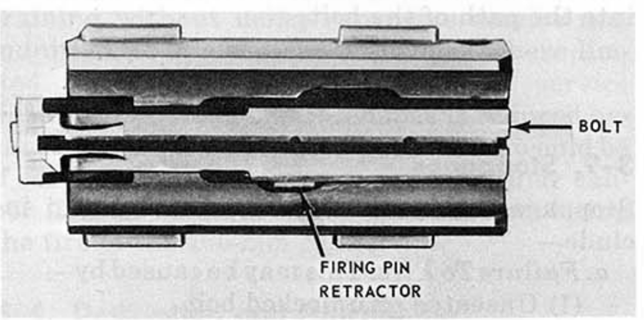


Figure 3-12. Bolt in locked position within bolt housing.

c. Unlocking (fig 3-11). As the bolt housing moves to the rear about one-half inch, it contacts the camming surface of the bolt assembly, forcing the rear of the bolt to the right and into the bolt housing so that it will clear the stationary breechblock in the left side of the receiver. This half turn allows the projectile to clear the muzzle and reduce the pressure in the chamber before the bolt is unlocked.

d. Extraction. The extractor grips the cartridge case while it is in the chamber. As the bolt moves to the rear, the extractor withdraws the empty cartridge case from the chamber.

e. Withdrawal of Firing Pin. As the bolt housing moves about one-half inch to the rear, it cams the firing pin retractor downward. This in turn cams the firing pin to the rear, withdrawing the firing pin from the face of the empty cartridge case.

f. Ejection. When the front of the empty cartridge case clears the rear of the chamber, the ejector (positioned to the rear of the magazine recess) strikes the base of the empty case and ejects it from the receiver.

g. Cocking. As the bolt assembly continues to move to the rear, it rides over the hammer, forcing the hammer to rotate to the rear. When the hammer rotates to its rearmost position, the sear engages the sear notch of the hammer and holds it in the cocked position.

h. Termination of Rearward Movement. The rearward movement ceases when the bolt assembly contacts the buffer of the backplate assembly. At this time the driving springs are compressed in their recesses in the bolt housing.

3-8. Forward Movement of the Bolt

a. Feeding. With the bolt in its rearmost position, the magazine follower, under the action of the follower spring, moves the top round into the path of the bolt.

b. Chambering. As the bolt housing assembly is driven by the compressed driving springs, the bolt strips off the top cartridge in the magazine and forces it into the chamber. When the bolt reaches its forward position, the extractor slides over and snaps into place over the rim of the cartridge case.

c. Locking (fig 3-12). When the bolt is all the way forward, the driving springs force the bolt housing forward until the locking surfaces on the bolt housing engage the locking surfaces on the bolt. This forces the rear of the bolt to the left side of the receiver. It is positioned in front of the stationary breechblock which is attached to the left side of the receiver just to the rear of the magazine catch assembly. This action locks the breech.

d. Termination of the Forward Movement. Termination of the forward movement takes place when the face of the bolt housing contacts the rear of the chamber.

Section IV. STOPPAGES AND IMMEDIATE ACTION

3-9. Stoppages

Stoppages of the caliber .50 spotting gun include—

a. Failure To Fire. This may be caused by—
- (1) Unseated or unlocked bolt.
- (2) Broken or maladjusted firing cable.
- (3) Defective or broken firing pin.
- (4) Defective ammunition.

b. Failure To Extract. This may be caused by—
- (1) Improper gas adjustment.
- (2) Broken or worn extractor.
- (3) Dirty or rough chamber.

c. Failure To Chamber. This may be caused by—
- (1) Improper gas adjustment.
- (2) Weak magazine spring.
- (3) Ruptured cartridge case in the chamber.
- (4) Dirty or rough chamber.

3-10. Immediate Action

When the spotting gun fails to fire, the gunner waits five seconds and pulls the bolt to the rear. He taps the magazine, releases the bolt, relays on the target, and attempts to fire.

3-11. Reduction of Stoppages

If the spotting gun misfires a second time and immediate action fails to reduce the stoppage, additional measures are applied.

a. After unloading the cartridge, the gunner inspects the primer. If it is dented, the ammunition is defective and different ammunition is loaded into the gun.

b. If the primer is not dented, the gun is not functioning properly. The gunner and the loader determine the cause of the stoppage and reduce it if possible.

CHAPTER 4

REPAIR PARTS AND EQUIPMENT, AMMUNITION, AND MAINTENANCE

Section I. REPAIR PARTS AND EQUIPMENT

4-1. Repair Parts

Each using unit is provided with a set of repair parts for both the recoilless rifle and the spotting gun. These are issued as field replacements for those parts most likely to become worn, broken, or otherwise unserviceable. Requisition parts to keep a complete set. Components of the set are listed in TM 9-1000-205-12.

4-2. Equipment

Tools and material necessary for authorized disassembly, assembly, and maintenance of the rifle are issued with it. Covers and tool rolls are also issued with the rifle. Use these items for prescribed purposes only. This equipment is listed in TM 9-1000-205-12.

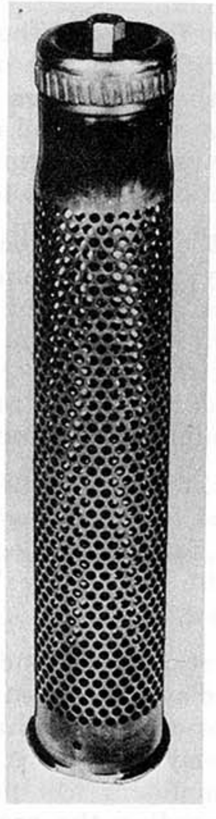


Figure 4-1. Caliber .30 subcaliber device, M9.

4-3. Caliber .30 Subcaliber Gun, M9

The subcaliber gun for the 106-mm recoilless rifle (fig 4-1) provides the gunner and loader training without using expensive service ammunition. It is also used on ranges where limited space precludes the use of service ammunition. Range maintenance is reduced because targets are not destroyed as they would be if service ammunition were used. Regular caliber .30 ball ammunition is used for simulating the fire of the 106-mm round.

4-4. Description and Functioning

a. Externally, the subcaliber gun M9 resembles a 106-mm cartridge case attached to the rear portion of a dummy projectile (case bushing) with a pre-engraved rotating band. It consists of a cartridge case shaped to fit into the chamber of the recoilless rifle. A caliber .30 barrel is screwed and pinned to the case bushing at the rear end of the case and is held in place by the barrel nut at the projectile end of the case (fig 4-2). The barrel has 24 holes drilled in it to reduce the muzzle velocity of the subcaliber round. Perforating the barrel also creates a backblast which simulates the backblast of the recoilless rifle.

b. The caliber .30 round is hand-fed into the caliber .30 barrel chamber. The chamber is locked against escaping propellant gases by the breechblock of the recoilless rifle.

c. The recoilless rifle firing pin is used to strike the subcaliber gun's firing pin thus causing the subcaliber gun's firing pin to indent the cartridge. The subcaliber gun's firing pin rides in a well in the breech door and is held in the well by staking on the door.

d. The cartridge case is extracted manually from the barrel chamber.

e. To zero the subcaliber gun, use the method

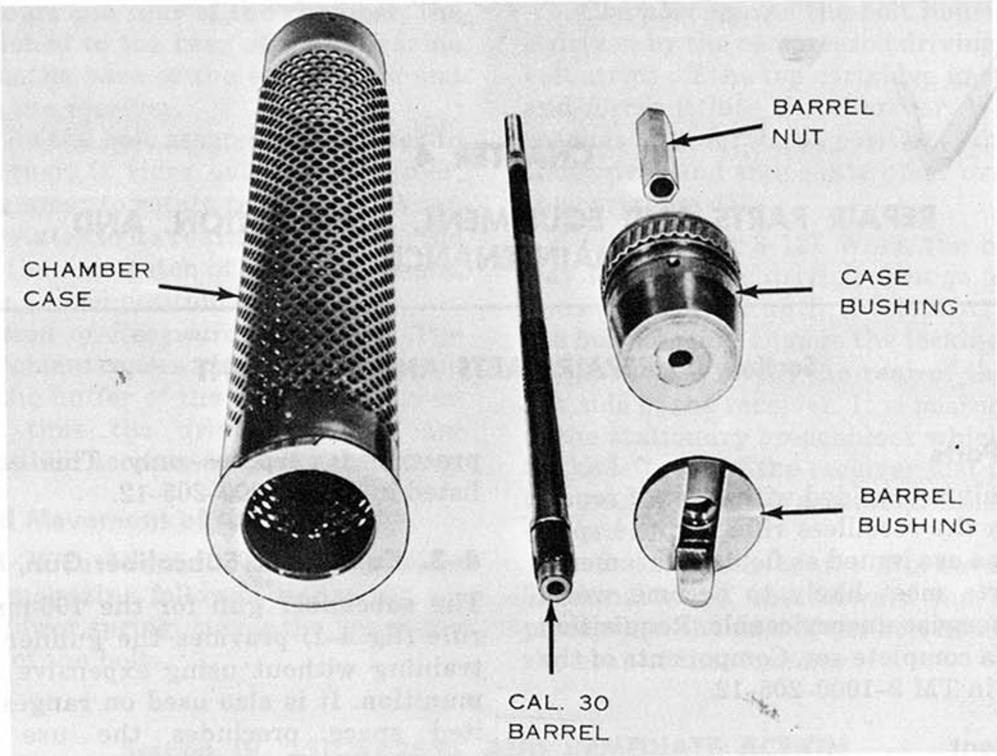


Figure 4-2. Caliber .30 subcaliber device (disassembly).

described in paragraph 5-27. Once zeroed, do not remove the subcaliber gun from the recoilless rifle unless necessary. Removal of the device may affect the zero.

4-5. Equipment Record System (Logbook)

a. General. The equipment logbook is issued with each 106-mm recoilless rifle and is used to keep a record of the weapon system. The logbook is stored in a plastic cover.

b. Contents. The logbook parts are—

(1) Equipment index for logbook.
(2) Lubrication record.
(3) Organizational maintenance record.
(4) Weapon record data.
(5) Equipment modification record.
(6) Field maintenance record.
(7) Equipment transfer record.
(8) Equipment acceptance record.
(9) Proof acceptance record.
(10) Equipment component register and index.

c. Purpose. These documents—

(1) Provide commanders with up-to-date knowledge of the material readiness of their equipment.

(2) Provide information with which to determine the condition and length of service of the equipment.

(3) Are permanently identified with the applicable equipment by nomenclature and serial numbers.

d. Instructions for Use. Instructions for making required entries are in TM 38-750. It is essential that the logbook remain with the rifle continually and that it be kept complete and up to date.

e. Procedure on Transfer. When transferring or shipping the rifle from one organization to another, follow the procedures in TM 38-750. Support units, base shops, and depots will not accept a rifle for repair or maintenance unless the logbook is complete and up to date.

f. Loss of Logbook. The logbook (equipment logbook assembly) is a permanent record. Its loss or destruction as a result of negligence will be cause for disciplinary action. If a logbook is lost, replace it at once and enter available data in the new log. Additional forms may be requisitioned through publication channels.

g. Loss of Rifle. When the rifle is condemned, destroyed, turned in for salvage, or otherwise lost from service, forward the log (as prescribed in TM 38-750) to U.S. Army Weapons Command, Rock Island, Illinois.

h. Security. Certain forms and records in the equipment record system, when filled out, may contain information which has intelligence value to the enemy. Therefore, under combat conditions, commanders will prescribe procedures for safeguarding the records in accord with AR 380-5.

4-6. General Description

Ammunition for the 106-mm recoilless rifle is issued in complete, fixed rounds. The term "fixed" means that the projectile and the cartridge case are crimped together and the propelling charge is nonadjustable. This assures correct alinement of the projectile and the cartridge case. It also permits faster loading because the projectile and the cartridge case are loaded as one unit. The propellant is in a plastic bag within the cartridge case. The cartridge case is perforated to permit expanding propellant gases to escape into the enlarged reaction chamber. The cartridge case has a well around the primer to permit the breech to be closed. Proper headspace is automatically provided by the seating of the flange of the cartridge case against the vent bushing.

4-7. Classification

Depending on the type of projectile, ammunition for the 106-mm recoilless rifle is classified as high explosive antitank (HEAT), high explosive plastic with tracer (HEP-T), and antipersonnel with tracer (APERS-T). The HEAT and HEP-T projectiles contain high explosives and are painted olive drab with yellow markings. These identifying colors are repeated on the sealing tape around the fiberboard container. Both rounds have a maximum range of 7,700 meters.

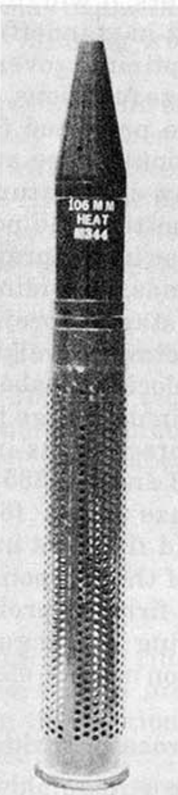


Figure 4-3. 106-mm HEAT round.

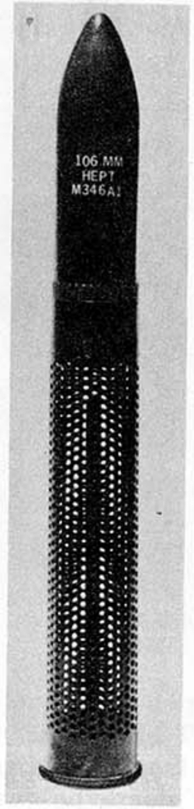


Figure 4-4. 106-mm HEP-T round.

4-8. Cartridge, 106-mm HEAT, M344A1

a. The HEAT round (fig 4-3) employs the shaped charge principle to destroy armor. It is designed for use against vertical armor and is more effective against "sandwich" or "honeycombed" armor than the HEP-T round. It does not depend upon velocity at the moment of impact for its effect. It relies upon a concentration of the effect of the explosive filler through its shape. The conical shape of the filler concentrates the force of the explosion into a hot jet that blows its way through the armor. The conical shape of the filler is maintained by a copper cone which forms a slug when the filler is exploded. This slug of metal may or may not follow the explosive jet through the armor. The complete round weighs 37.23 pounds. The projectile weighs about 17 pounds, contains 2.79 pounds of composition B explosive, and has a muzzle velocity of 1,650 feet per second.

b. For maximum effect the shaped filler must be a certain distance from the face of the armor when it detonates. This distance is called *stand-*

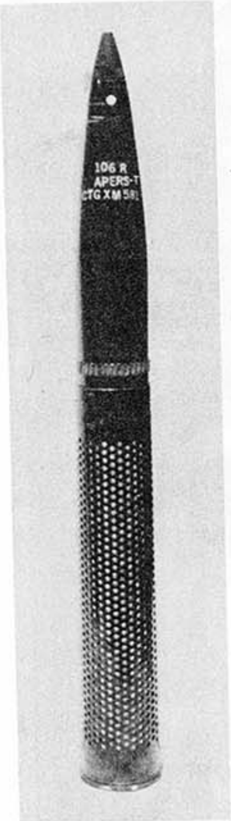


Figure 4-5. 106-mm APERS-T round.

off. Standoff is provided by the ogive, or ballistic windshield, on the nose of the projectile.

c. The projectile is equipped with a point initiating base detonating fuze and is fin stabilized.

4-9. Cartridge, 106-mm HEP-T, M346A1

a. The HEP-T round (fig 4-4) is designed primarily for use against armor. Detonation of the explosive charge sets up shock waves that cause a "spalling" or chipping of the interior tank surface. It is effective without penetrating. The projectile is more effective against sloping armor than against vertical armor. It is also very effective against bunkers, weapons positions, and troops.

b. The projectile is equipped with a base detonating fuze and contains a tracer element. It weighs 17 pounds, contains 7.7 pounds of composition A-3 plastic explosive, and has a muzzle velocity of about 1,650 feet per second. The complete round weighs 38 pounds and is spin stabilized.

c. Upon impact, the plastic filler within the projectile has a tendency to spread out over the target surface.

d. The HEP-T projectile has a pre-engraved rotating band and two indexing buttons to facilitate insertion of the round into the tube of the weapon.

Caution: Chambering 106-mm rifle ammunition fitted with indexing buttons is made easier and damage to the rifling of the weapon is prevented by strict conformance to the following procedure:

(1) Insert the round into the chamber and slowly push it forward until the indexing buttons contact the rifling. While maintaining a slight forward pressure on the cartridge base, rotate it either way until you feel the indexing buttons engage the grooves of the rifling.

(2) When the indexing buttons are engaged, push the round into the chamber as far as it will go.

4-10. Cartridge, 106-mm APERS-T, M581

a. The APERS-T cartridge (fig 4-5) is for antipersonnel purposes only. The projectile contains 9,000 flechettes (fin stabilized fragments of steel wire). Two indexing buttons, spaced 180° apart on the forward bourrelet of the projectile, facilitate indexing of the pre-engraved rotating band with the rifling in the bore of the rifle to make the round spin stabilized.

b. The fuze can be adjusted so that it functions at muzzle action or at ranges from 200 to 3,300 meters. If the fuze is set for muzzle action it will function when it is three meters from the muzzle. If the fuze is set at any range between 200 and 3,300 meters, it will function 137 meters (because of a built-in standoff) short of the fuze setting to allow optimum coverage of the target area. When the fuze functions, the flechettes are dispersed and are projected forward in an 18° cone by the rotational force and velocity of the projectile. A yellow dye mixture is expelled with the flechettes, spotting the point of fuze functioning. The tracer in the projectile base burns for about 5 seconds, providing a visible trace during the early stage of projectile flight.

c. The complete round weighs 41 pounds and has a muzzle velocity of about 1,440 feet per second. The maximum range is 3,300 meters.

d. Follow the precautions in firing as stated in TM 9-1300-203 and AR 385-63.

(1) If the fuze is set for muzzle action, troops must avoid the area immediately to the front and sides of the weapon.

(2) Overhead firing is prohibited.

(3) When firing at ranges less than 1,000 meters, the weapon must be elevated to 27 mils.

4-11. Spotter-Tracer Cartridge, Caliber .50

a. The spotting gun employs a spotter-tracer round (fig 4-6). The projectile contains a tracer element and an incendiary filler. On impact,

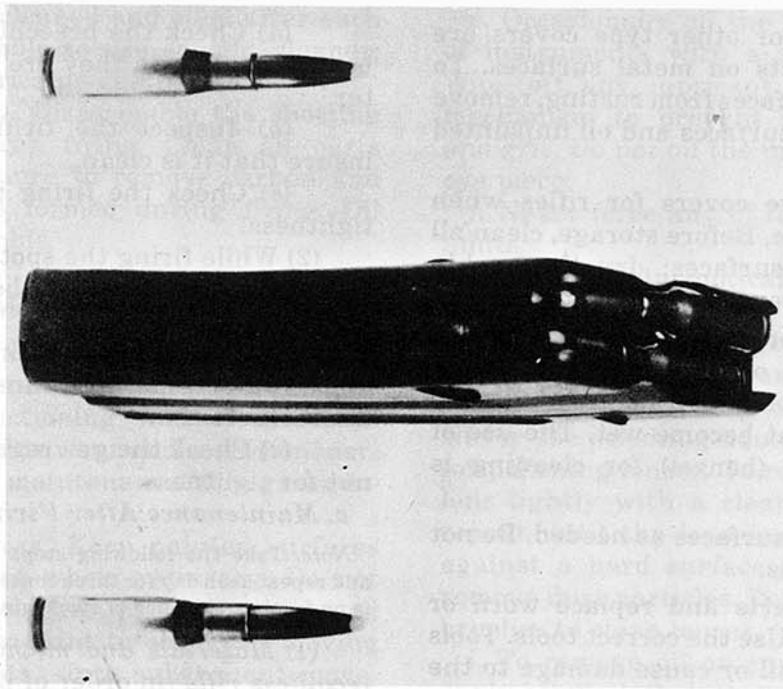


Figure 4-6. Caliber .50 spotter-tracer round.

the incendiary filler produces a puff of white smoke which aids in adjusting fire. The tracer burnout point is about 1500 meters. The round can be identified by the red and yellow marking on the nose of the projectile. Handle spotter-tracer ammunition with care because it is neither drop safe nor bore safe. A sharp blow to the nose of the round may cause the spotter element to ignite, possibly injuring troops or damaging equipment.

b. The spotter-tracer round is designed so that its trajectory closely matches the trajectory of 106-mm recoilless rifle service ammunition. Its muzzle velocity is 1,750 feet per second, and its maximum range is 3,100 meters. Never use ammunition other than spotter-tracer in the spotting gun.

4-12. Care, Handling, and Preservation

Rounds for the 106-mm recoilless rifle are packed singly in moisture-proof fiberboard containers and sealed with tape. Two rounds in their containers are packed in a wooden box and weigh about 123 pounds. This packaging is designed to withstand normal field use. Since moisture and heat adversely affect ammunition, observe the following precautions:

a. Do not take sealing tape off the fiberboard container until ammunition is to be used.

b. Protect ammunition from high temperatures and from direct rays of the sun. Do not disassemble fuzes.

c. Inspect the ammunition for punctured propellant containers, burrs and excessive paint on the projectile or on the rotating band. Keep the complete round free of dirt or mud.

d. Return unfired rounds to their original containers and mark them. Fire these rounds first in subsequent firing.

e. Never handle duds. If a projectile is fired and fails to explode, the fuze may be armed. Any movement of the projectile may cause it to explode. In training areas, mark dud locations and report them to the range officer.

Section III. MAINTENANCE

4-13. General

a. The 106-mm recoilless rifle squad or using organization performs the preventive maintenance discussed in this section. The procedures are designed to insure proper functioning of the equipment and to increase the useful life of the rifle. Careful supervision of the execution of these measures assures effectiveness.

b. Grit or dirt accumulated during traveling or from the blast of the rifle when it is fired gouges or scores the surfaces of the piece. Powder fouling collects on the rifle, attracting moisture and rust. The fouling prevents proper operation of the moving parts. Clean the dirt, grit, and powder fouling from all parts frequently. Rust may be removed by using crocus cloth. When canvas or other type covers are used, moisture collects on metal surfaces. To prevent the metal surfaces from rusting, remove covers daily. Dry all surfaces and oil unpainted surfaces.

c. Install protective covers for rifles when they are not in service. Before storage, clean all exposed, unpainted surfaces; dry thoroughly and coat with rust preventive compound.

d. Do not use water, steam, or air, which is under high pressure, on any part of the weapon. Wash with a sponge or rag. Carefully dry and oil any parts that become wet. The use of gasoline or benzene (benzol) for cleaning is prohibited.

e. Retouch painted surfaces as needed. Do not paint over nameplates.

f. Tighten loose parts and replace worn or unserviceable parts. Use the correct tools. Tools that do not fit will fail or cause damage to the parts.

g. Do not use abrasives more coarse than crocus cloth on any part of the equipment.

4–14. Preventive Maintenance

Perform preventive maintenance for the system as follows:

a. Maintenance Before Firing. Proper maintenance before firing precludes most stoppages.

(1) Before firing the recoilless rifle—

(*a*) Remove and disassemble the breech mechanism. Wipe all parts dry of oil to prevent formation of carbon. Inspect all parts for serviceability.

(*b*) Clean all dirt and oil from the bore and chamber.

(*c*) Assemble the breech mechanism and wipe all outer surfaces dry with a clean rag.

(*d*) Check rifle for proper functioning.

(*e*) Make certain the sight is properly and firmly mounted.

(2) Before firing the spotting gun—

(*a*) Field strip the gun. Clean all parts and wipe dry. Inspect all parts for serviceability.

(*b*) Apply rifle grease to the bolt guide slots and to the lugs of the bolt housing. Apply grease sparingly to prevent sluggish action.

(*c*) Assemble the gun and check functioning of the firing mechanism.

(*d*) Check for proper setting of the gas regulating needle (para 3–4*d*(3)).

(*e*) Clean all dirt and dust from the magazine. Check for dents or bent lips that could prevent proper feeding.

b. Maintenance While Firing.

(1) While firing the recoilless rifle—

(*a*) Check the breechblock, chamber, and bore to be certain they are free of foreign matter.

(*b*) Inspect the firing pin aperture to insure that it is clean.

(*c*) Check the firing pin housing cap for tightness.

(2) While firing the spotting gun:

(*a*) Check the chamber and bore for foreign matter.

(*b*) Periodically check the face of the bolt and the firing pin aperture to insure they are unobstructed.

(*c*) Check the gas regulating needle wingnut for tightness.

c. Maintenance After Firing.

Note. Take the following steps immediately after firing and repeat each day for three consecutive days or until there is no further evidence of sweating inside the rifle.

(1) *Materials and methods for cleaning the recoilless rifle* (in order of preference).

(*a*) *Solvent.* Clean the bore thoroughly with issue cleaner compound solvent. Insure that all surfaces are well coated. Do not wipe or clean bore with cleaner compound solvent until the tube is cool enough to be touched with the bare hand. Solvent cleaner is an excellent rust preventive for periods from 24 to 48 hours. If the rifle is to be fired within the next 24 hours, do not wipe dry until just before firing. If the rifle is not to be fired within the next 24 hours, wipe dry and coat with prescribed oil. Starting on the fourth day after firing, renew the oil film daily. Every fifth day clean with cleaner compound solvent, wipe dry and oil.

(*b*) *Soap.* Prepare a sponging solution by shaving one pound of castile or issue soap into four gallons of water. Warm the water to help dissolve the soap. In temperatures below 32° F, and if the tube is cold, add the type and amount of antifreeze prescribed in TM 9–1000–205–12. When soap is used, rinse the bore thoroughly after cleaning. Soap may cause corrosion if not completely removed.

(*c*) *Hot water.* The rifle can be cleaned while it is hot by swabbing it with hot water. Dry the bore thoroughly and coat with oil at once to prevent rusting. This method is temporary because the primer salts and powder residue may not be removed. As soon as possible clean the rifle again by using method (*a*) or (*b*) above.

(2) *Chamber and breech mechanism.* Use methods and solvents described in (1) above to clean the chamber and vent bushing. Use a burlap or waste swab on a stick in the chamber. Disassemble breech mechanism and clean and oil all moving parts after each firing. The vent bushing should be cleaned and oiled after each firing. It is preferable to use solvent cleaner; however, other lubricants can be used.

(3) *Disassembly.* Disassemble the spotting gun after each day's firing. Clean all parts thoroughly, being sure to remove carbon and gummy substances formed during firing. Oil lightly and reassemble.

4–15. Preventive Maintenance, Mount, M79

The 106-mm rifle mount will operate with a minimum of maintenance by the using unit. To insure proper functioning and to preserve equipment from undue wear and corrosion, perform the following maintenance at regular intervals.

a. Painted Surfaces. Keep painted surfaces clean. Retouch paint when necessary. Do not paint over nomenclature plates or warning plates. Do not allow paint to collect at moving joints or pivot points, since subsequent movement of the parts will be sluggish and the protective coat of paint will be cracked.

b. Keep Mount Clean. Dirt that collects on the mount scores the surfaces and causes undue wear. Insure that the locking yoke and transfer box are clean before mounting the rifle.

c. Oiling Points. To assure smooth operation, apply oil to the following points at weekly intervals:

(1) Threaded portions of locking yoke.
(2) Base locking lever.
(3) Central bushing end of each rear leg.
(4) Axle of wheel.
(5) Rear leg clamp device.

d. Lubrication. The traversing and elevating mechanisms are lubricated and sealed at the time of manufacture. With normal care they require no further attention by the using unit. In the event the mount is submerged in water, send it to a direct support maintenance unit for cleaning and lubrication.

e. Cleaning Materials and Lubricants. The prescribed cleaning materials and lubricants can be found in the lubrication order which is issued with each weapon.

4–16. Maintenance and Preservation, M92D and M92F Elbow Telescopes

a. When not in use, keep the instruments in the case provided.

b. Keep the instruments as dry as possible. Do not put them in carrying cases when wet.

c. Perform only authorized adjustments. Do not turn screws or other parts unless essential to the use of the instrument.

d. Do not paint the fire control equipment.

e. Occasionally oil the exposed moving parts of instruments with a small quantity of oil. Wipe off any lubricant that seeps from the mechanism to prevent accumulation of dust and grit. Do not oil the interior parts or rubber eye piece.

f. Never force any of the knobs beyond their limits.

g. Do not point optical instruments directly at the sun.

h. Keep the exposed surfaces of lenses and other optical parts clean and dry to prevent corrosion and etching of the glass surfaces. Never use polishing liquids, paste, or abrasives for polishing lenses. To remove dust, brush the lens lightly with a clean camel's hair brush; repeat until the lens is clean. Tap the brush against a hard surface from time to time to remove dust particles. Do not use coarse bristle brushes to clean lenses.

i. To remove oil or grease from glass parts, apply ethyl alcohol, then wipe gently with lens tissue. If alcohol is not available, breathe heavily on the glass and wipe dry with lens tissue.

j. Moisture collects on optical parts when the parts are colder than the surrounding air. Remove this moisture, if it is not excessive, by placing the instrument in a warm place. Do not apply heat directly to any part of the instrument, since uneven expansion of metal parts results in breakage or distortion of the optics.

4–17. Care in the Field

Apply procedures described in paragraphs 4–14 through 4–16 in the field when materials and conditions permit. When cleaning materials are not available, swab the rifle with damp cloths and then dry thoroughly. Follow this by swabbing with an oily cloth. This expedient is a temporary measure.

a. Cleaning in Cold Climates.

(1) In temperatures below freezing, keep moving parts of the rifle free from moisture, including oil. Oil congeals at low temperatures and causes sluggish operation or complete failure. This is especially true of the small, spring-operated parts in the breech and firing mechanism. Protect the rifle from frost by wiping it dry after exposure to moisture and by using proper covers when the rifle is not in service.

(2) When a rifle is brought into a heated building after exposure to cold weather, disassemble and wipe it dry after it reaches room temperature. This removes condensed moisture on the rifle and prevents rusting. Oil the rifle before reassembly.

b. Cleaning in Hot Climates. In hot climates, the oil film necessary for operation and preservation dissipates more rapidly than normal and must be renewed frequently to prevent rust. Keep screws and pins lightly oiled to prevent their freezing in place due to rusting in their seats. Perspiration causes rust. After handling the rifle, wipe it dry and restore the oil film.

c. Cleaning Under Sandy or Dusty Conditions. Where dust and sand are prevalent, protect the rifle by using the proper covers. Dust and sand in the bore and mechanism forms a gummy paste that interferes with the functioning of the rifle. This mixture of dirt and oil forms an abrasive that scores and wears the parts. To prevent this, clean and lubricate the rifle as frequently as necessary. In lubricating, apply as thin a coat of oil as proper functioning will allow. Oil moving parts and contacting surfaces. Keep the remainder of the rifle dry and free of moisture.

d. Cleaning in Moist or Salty Atmosphere. Moist, salty air causes steel to rust quickly and rapidly destroys the rust preventive qualities of oil. Because of this, exercise extreme care in maintaining the rifle. Apply those measures prescribed in *b* above for hot climates.

4–18. Decontamination Procedures

a. Oil rifles completely if chemical, biological, or radiological attacks are anticipated. Also oil accessories, except ammunition. Keep ammunition boxed when possible. Test for contamination. Perform tests whether or not equipment is believed to be contaminated, if contaminating materials have been used in the area. If equipment is not contaminated, clean and prepare it for use.

b. If equipment is contaminated, decontamination troops should use a complete suit of protective clothing (permeable or impermeable) including impermeable protective gloves and a protective mask.

(1) Equipment contaminated with chemicals other than the blister agents, G-series or V-agents, is decontaminated by airing. For faster decontamination and to protect against corrosion, clean rifles and accessories with cleaning compound solvent, denatured alcohol, or soap and water.

(2) Equipment contaminated by blister agents, G-series or V-agents, is decontaminated as follows:

(*a*) Remove all dirt, dust, grease, and oil.

(*b*) Expose all parts to air.

(*c*) Decontaminate all metal surfaces, except the bore, with agent decontaminating, noncorrosive DS–2. Hot, soapy water is also an effective cleaner (FM 21–40).

(*d*) Protective ointment, M5, can be used for emergency decontamination (FM 21–40).

(*e*) Test with detector kit to determine if decontamination is complete. If complete, then clean, dry, oil, and prepare the rifle for use.

(*f*) Burn or preferably bury all rags and wiping materials. Take care to protect men against vapors created by burning.

(3) In general, these actions are applicable to equipment contaminated by biological or radiological attack. Detailed information on decontamination is contained in FM 21–40 and TM 3–220.

4–19. Destruction to Prevent Enemy Use

a. General.

(1) Destruction of the weapon system and related material, when subject to capture or abandonment in the combat zone, will be undertaken by the using unit only when, in the judgment of the unit commander concerned, such action is necessary in accord with orders of or policy established by the commander concerned. More detailed information on destruction of the recoilless rifle and related equipment can be found in TM 9–1000–205–12.

(2) When the commander concerned considers it necessary, he orders the weapon's destruction to prevent one or more of the following:

(*a*) Capture by the enemy.

(*b*) Use against own troops.

(*c*) Abandonment in the combat zone.

(*d*) To deprive the enemy intelligence agencies knowledge of its existence, functioning, or specifications.

b. Principles of Destruction.

(1) Methods of destruction are adequate, uniform, and easily followed in the field.

(2) Destruction is to be as complete as possible within limitations of time, equipment, and personnel. In any event, the most important parts of the rifles are destroyed or evacuated. The same essential parts are destroyed or evacuated on all like units to prevent the enemy from constructing one complete rifle from several damaged ones.

(3) Crews are to be trained in the prescribed methods of destruction.

(4) Certain methods of destruction require special tools and equipment, such as TNT or plastic explosives and incendiary grenades. Issue of such special equipment and its use are command decisions and depend on the tactical situation.

(5) For methods of destroying vehicles, see appropriate TM's.

(6) Methods described are listed in the order of their effectiveness. Use the method most appropriate to the circumstances. Follow the sequence in which the steps are given.

c. Destruction of 106-mm Recoilless Rifle.

(1) *Optical instruments.* Remove the direct fire sight. This elbow telescope is costly, difficult to replace, yet relatively light. It should be evacuated if possible. When evacuation is impractical, smash all sights and binoculars.

(2) *Method No. 1, with incendiary grenades.* With the muzzle higher than the breech, and the breech closed, insert four unfuzed incendiary grenades end to end, midway in the tube. Ignite the four grenades with a fifth grenade equipped with a 15-second delay igniter. Metal from the tube will fuze with the breechblock, fill the grooves in the rifling and possibly seal the lower vent bushing. (Less than four grenades may be used if supply is insufficient but destruction will not be as complete.) To insure destruction of the vent bushing, place an additional incendiary grenade with a 15-second delay igniter on top of the breech end of the weapon as far to the rear as possible. Time required—2 to 3 minutes.

(3) *Method No. 2, with demolition materials.* Prepare and place charges of TNT or plastic explosives, together with necessary detonating cord, making up each charge as follows:

(*a*) Insert a two-pound charge in the muzzle end of the tube. Plug muzzle tightly with any available material, such as rags or mud, to a distance of about one foot.

(*b*) Insert a four-pound charge into the chamber. Pass detonating cord through one of the vents in the vent bushing. Plug vents with any available material, using care not to damage the detonating cord.

(*c*) Connect all charges for simultaneous detonation with detonating cord. Prime the charge with either a nonelectric blasting cap crimped to at least 5 feet of safety fuze (safety fuze burns at the rate of 1 foot in 30 to 45 seconds; test before using) or with an electric cap and firing wire. Keep blasting caps, detonating cord, and safety fuze separated from charges until required for use. The safety fuze, which contains black powder, and the nonelectric blasting caps must be protected from moisture prior to use. The safety fuze may be ignited by a fuze lighter. The electric blasting cap requires a blasting machine or equivalent source of electricity. If primed with nonelectric blasting cap, take cover before firing. Time required: 15 minutes.

(4) *Method No. 3, with another rifle, howitzer, or rocket launcher.* With another weapon, fire HEAT, HE, or AP (armor piercing) projectiles at the rifle until it is rendered useless.

d. Destruction of Caliber .50 Spotting Gun. Field strip the gun. Use an axe to deform and crack the receiver by striking it at the side nearest the ejection port. Place one end of each driving spring under foot and pull it out of shape. Place the backplate, buffer assembly, and magazines on a firm surface and smash them out of shape. Remove the firing pin partially from the bolt and break it off by striking it on a firm surface. Bend the barrel and operating rod by striking them with an axe. Remove the bolt guides and firing pin retractor and evacuate them if possible. If evacuation is not possible, bury these parts or scatter them over a wide area. Time required: 3 minutes.

e. Destruction of ammunition.

(1) *General.* When possible, ammunition that must be destroyed should be fired in the direction of the enemy. If firing the ammunition is not feasible for some reason, other destructive methods must be used. Time usually does not permit the destruction of all ammunition in forward combat zones. With sufficient time and materials, ammunition is destroyed as indicated in (2) and (3) below. In general, methods and safety precautions outlined in TM 9–1300–206 are followed whenever possible.

(2) *Unpacked ammunition.*

(*a*) Stack ammunition in small piles. Stack or pile most of the available gasoline in cans and drums around the ammunition. Throw all available flammable material, such as rags, scrap wood, and brush, on the pile. Pour the remaining gasoline over the pile. Use sufficient flammable material to insure a hot fire. Ignite the gasoline and take cover.

(*b*) The 106-mm ammunition may be destroyed by sympathetic detonation using TNT or plastic explosives. Stack the ammunition in two stacks, about 3 inches apart, with the noses of the projectiles toward each other. Use a 1 pound explosive charge to four or five cartridges of ammunition. Take cover and detonate all explosive charges simultaneously.

(3) *Packed ammunition.* Stack boxed ammunition in small piles. Cover with all available materials such as rags, scrap wood, brush, and gasoline drums or cans. Pour gasoline over the pile. Ignite and take cover. (Small arms and spotting gun ammunition must be broken out of boxes or cartons before burning.)

f. Destruction of Mount, M79.

(1) Destruction of the recoilless rifle mount is normally undertaken only after the recoilless rifle, the spotting gun, and the fire control

equipment are destroyed. In most cases, time is important when destruction of the equipment is undertaken. Therefore, rifles and fire control equipment are destroyed first.

(2) The most easily destroyed parts of the mount are the elevating and traversing mechanisms. To destroy them, remove and smash all parts.

CHAPTER 5

TECHNIQUE OF FIRE

Section I. GENERAL

5-1. Terminology and Scope

a. Terminology.

(1) *Technique of fire.* Methods of placing effective fire on a target.

(2) *Direct laying.* Pointing a weapon for deflection and elevation by laying on a target visible to the gunner as he looks through the sight.

(3) *Direct fire.* Firing conducted when the gunner is using direct laying.

b. Scope. Training in marksmanship is a prerequisite for instruction in direct laying. Direct laying involves a knowledge of—

(1) Characteristics of fire.

(2) Range, apparent speed, and lead determination.

(3) Fire commands.

(4) Fire control.

(5) Range cards.

5-2. Characteristics of Fire

a. Trajectory.

(1) The trajectory of a projectile is the curve traced by the center of gravity of the projectile in its flight from the muzzle of the weapon to the point of impact. A knowledge of the trajectory is important, especially in firing antitank rounds and when firing over the heads of friendly troops.

(2) The recoilless rifle is a flat trajectory weapon. The muzzle velocity and the weight of the projectile are the most important factors in determining the flatness of the trajectory. In all cases, due to the force of gravity and air resistance, the trajectory of a projectile is a curve and not a straight line. Air resistance retards the projectile during flight causing the angle of fall to be greater than the angle of elevation. Therefore, the projectile reaches its maximum ordinate (highest point) closer to the point of impact than to the rifle (fig 5-1).

(3) A line tangent to the trajectory at the point of impact is called the line of fall. The vertical angle between the line of fall and the ground at the point of impact is called the angle of fall.

b. Dispersion.

(1) When firing a large number of rounds from a rifle having elevation, deflection, and other conditions as nearly identical as possible, the points of impact of the projectiles are scattered both in range and deflection. This scattering is called dispersion. The greatest concentration of points of impact is near the center of the group. Approximately as many rounds fall short of the center as fall beyond, and as many to the right as to the left.

(2) Among factors that cause dispersion are

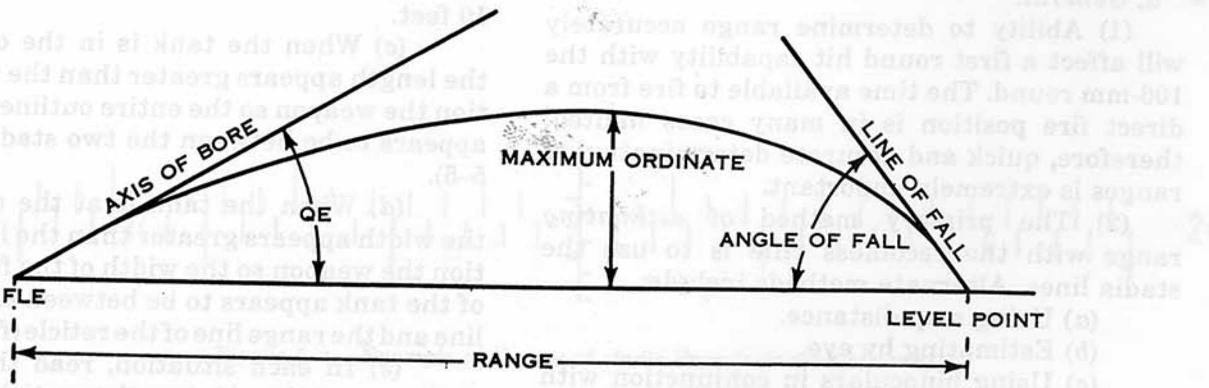


Figure 5-1. Elements of trajectory.

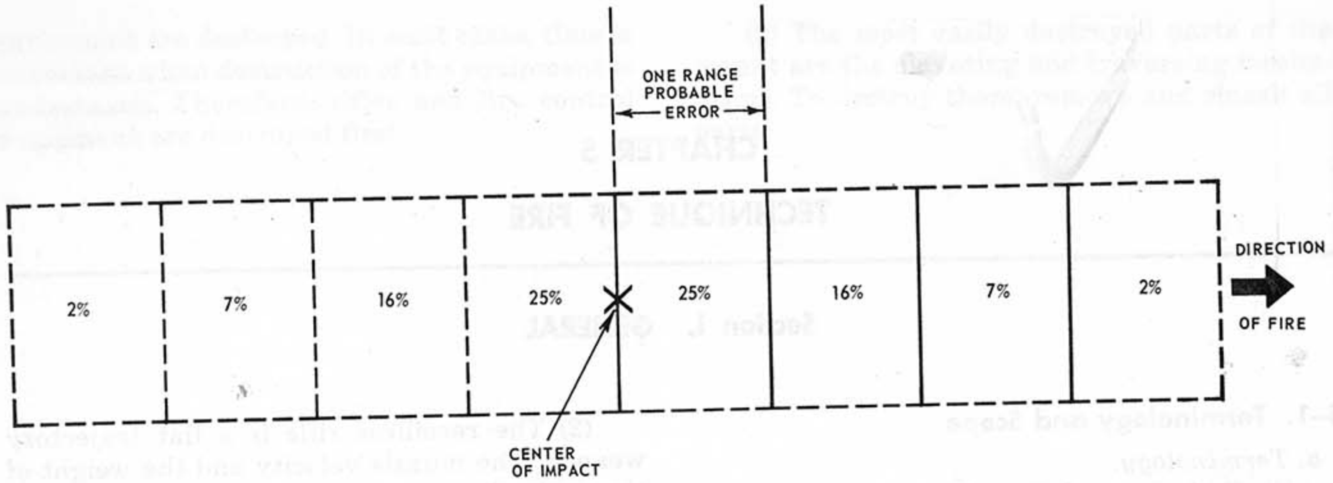


Figure 5–2. Dispersion rectangle.

variations in weight and composition of the propellant, weight and balance of the projectile, and atmospheric conditions.

c. Dispersion Rectangle and Probable Error. In general, the points of impact of each round fired, using the identical sight picture, may be included in a rectangle with its longer axis along the gun-target line. If this rectangle is divided into eight equal parts by lines drawn perpendicular to the line of fire, the percentage of points of impact to be expected in each part is as shown in figure 5–2. Notice that each of the two segments nearest the center of the dispersion rectangle contain 25% of all impacts. The length (in the direction of fire) of each segment of the dispersion rectangle represents *one range probable error.* The value, in meters, of one range probable error, which varies with the range from the rifle to the center of impact, is given in the firing table pertaining to the type ammunition being fired. Deflection probable error follows the same pattern, and its value may also be found in the firing table.

5–3. Range Determination

a. General.

(1) Ability to determine range accurately will affect a first round hit capability with the 106-mm round. The time available to fire from a direct fire position is in many cases limited; therefore, quick and accurate determination of ranges is extremely important.

(2) The primary method of *estimating* range with the recoilless rifle is to use the stadia lines. Alternate methods include:

(*a*) Using map distance.

(*b*) Estimating by eye.

(*c*) Using binoculars in conjunction with the mil relation formula.

(3) The primary method of *determining* range with the 106-mm recoilless rifle is to use the spotting gun.

b. Use of Stadia Lines.

(1) Stadia lines on the M92D and M92F sight reticles assist in estimating range to targets of known dimensions. Stadia lines are curved lines inscribed on the reticle. They measure distances by means of angles. As a basis for construction of the stadia lines, all tanks are considered to be 20 feet long and 10 feet wide. These dimensions are not exact for all tanks, but the variations do not materially affect the accuracy of the range estimation.

(2) Rules for applying stadia measurements are:

(*a*) When the tank is broadside to the rifle location, adjust the lay of the weapon until the ends of the tank appear to touch the stadia lines (fig 5–3).

(*b*) When the tank is facing directly toward or directly away from the weapon, adjust the lay of the rifle until one side of the tank appears to touch one stadia line and the other side appears to touch the vertical range line of the sight reticle (fig 5–4). Use only one of the stadia lines since assumed width of the tank is 10 feet.

(*c*) When the tank is in the oblique and the length appears greater than the width, position the weapon so the entire outline of the tank appears to be between the two stadia lines (fig 5–5).

(*d*) When the tank is at the oblique and the width appears greater than the length, position the weapon so the width of the front or rear of the tank appears to be between either stadia line and the range line of the reticle (fig 5–6).

(*e*) In each situation, read the range to the target at the point on the verticle range line that corresponds with the center of mass of the

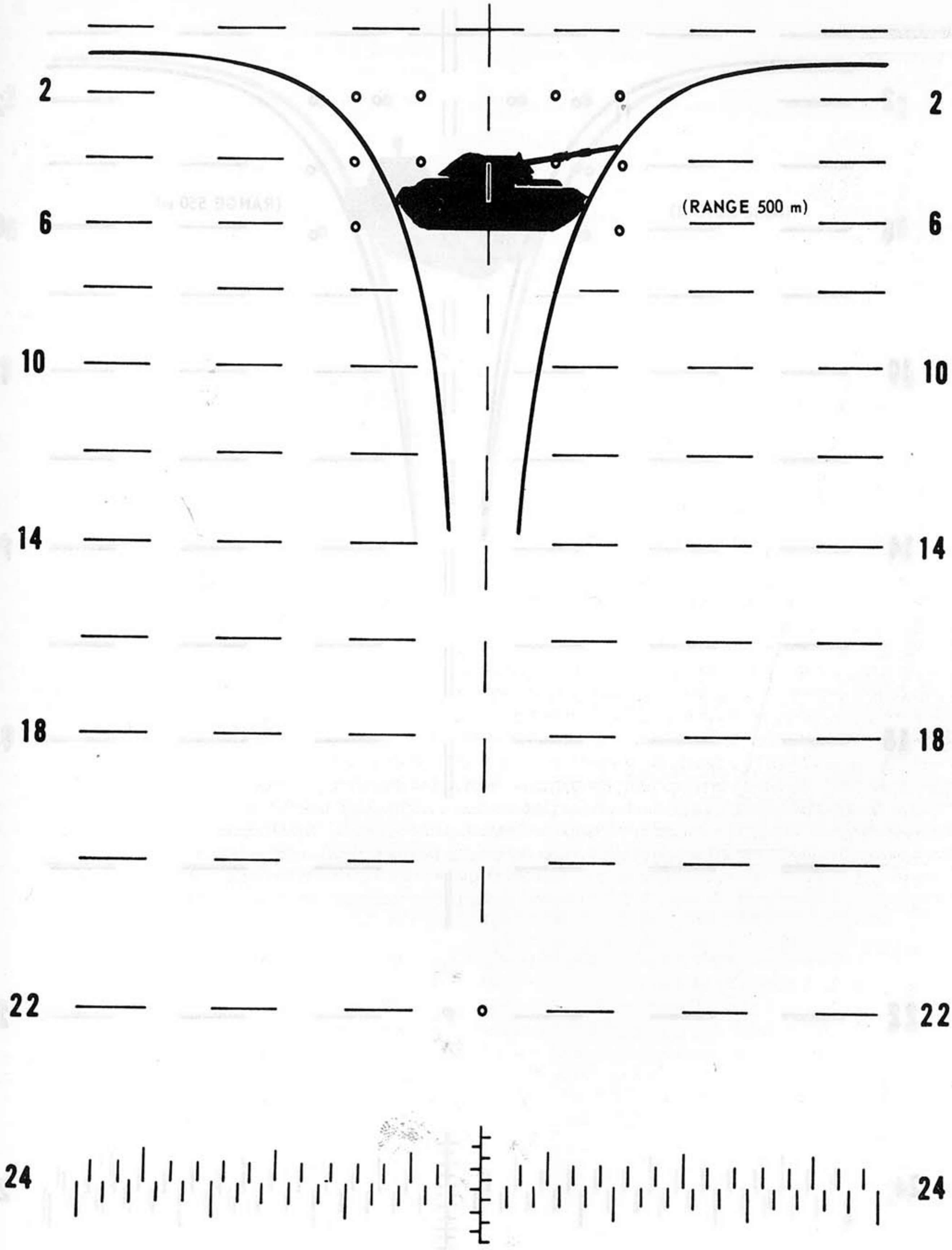


Figure 5–3. Example of the use of stadia lines (side view of tank).

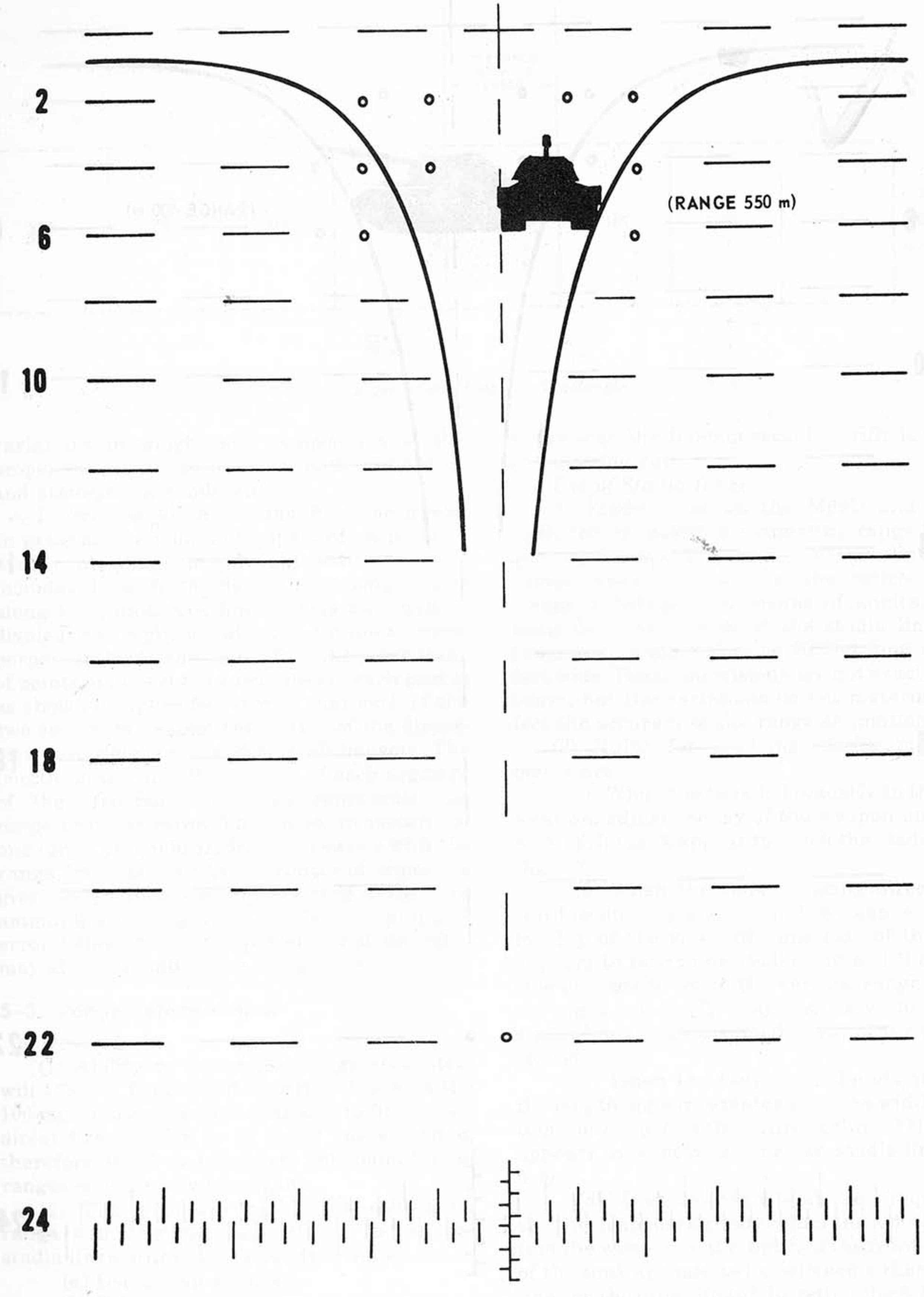


Figure 5-4. Example of the use of stadia lines (front view of tank).

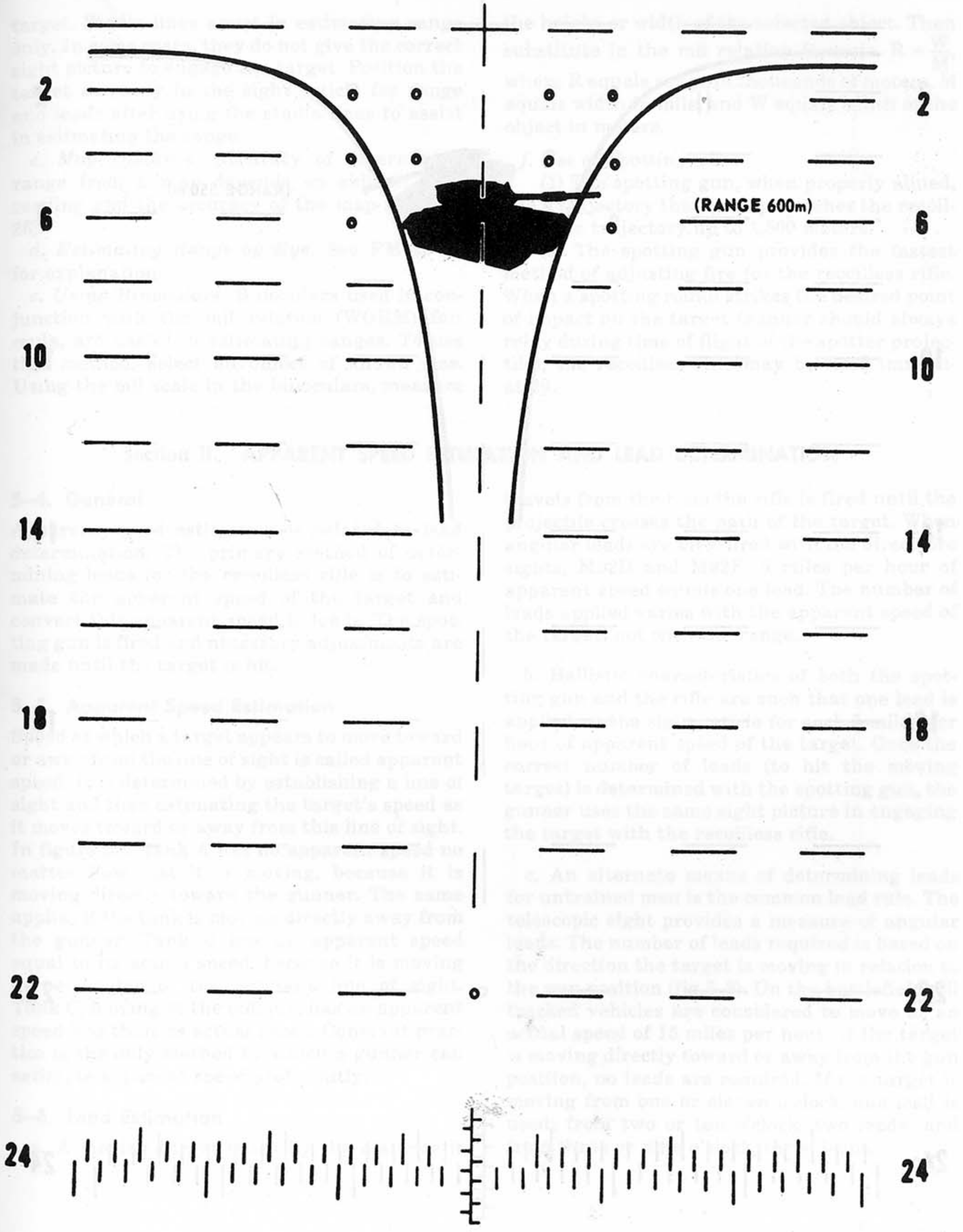


Figure 5-5. Example of the use of stadia lines (side oblique view of tank).

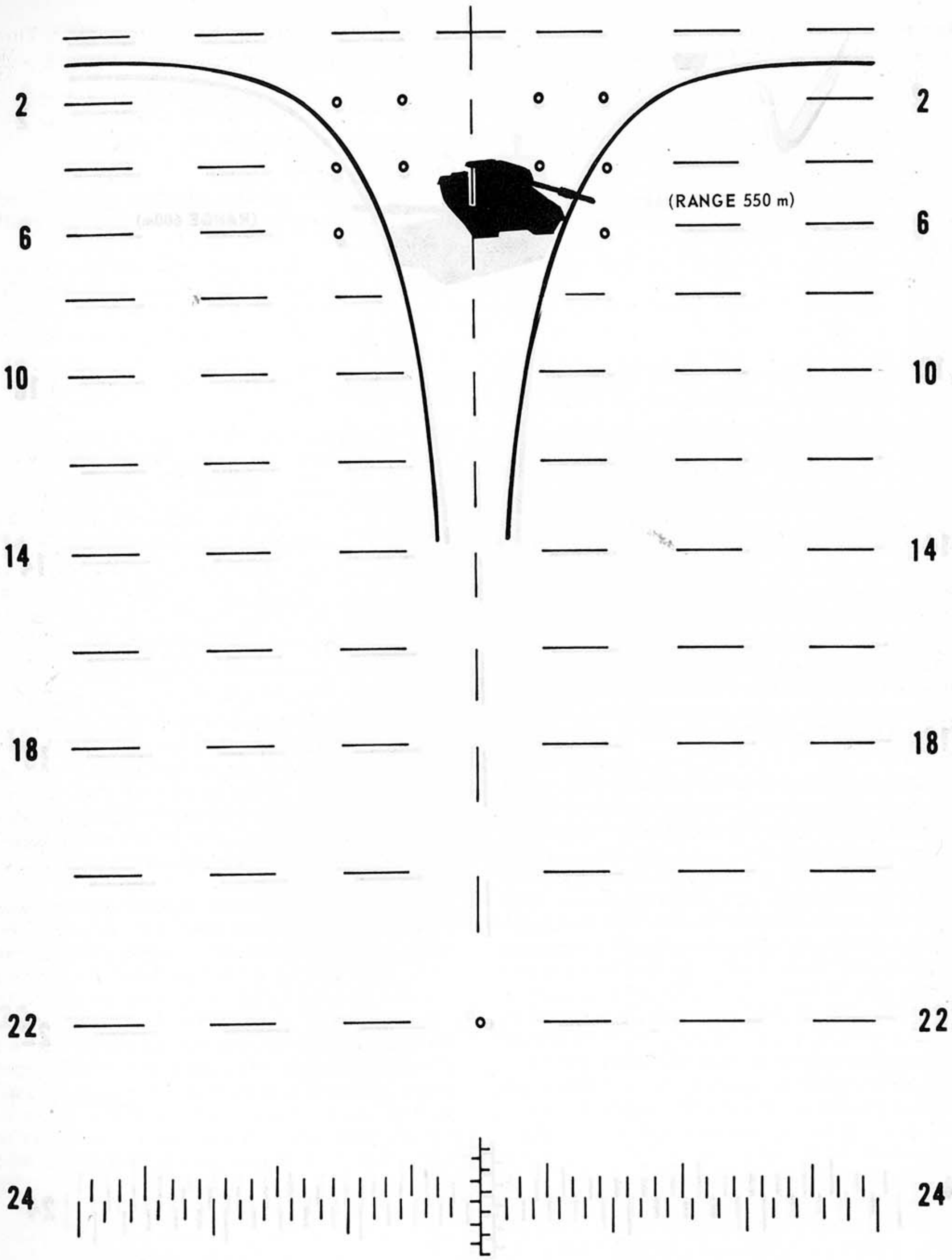


Figure 5–6. Example of the use of stadia lines (front oblique view of tank).

target. Stadia lines assist in estimating range only. In some cases, they do not give the correct sight picture to engage the target. Position the target correctly in the sight reticle for range and leads after using the stadia lines to assist in estimating the range.

c. Map Distance. Accuracy of determining range from a map depends on skill in map reading and the accuracy of the map (FM 21–26).

d. Estimating Range by Eye. See FM 23–12 for explanation.

e. Using Binoculars. Binoculars used in conjunction with the mil relation (WORM) formula, are useful in estimating ranges. To use this method, select an object of known size. Using the mil scale in the binoculars, measure the height or width of the selected object. Then substitute in the mil relation formula. $R = \frac{W}{M}$, where R equals range in thousands of meters, M equals width in mils, and W equals width of the object in meters.

f. Use of Spotting Gun.

(1) The spotting gun, when properly alined, has a trajectory that closely matches the recoilless rifle trajectory up to 1,500 meters.

(2) The spotting gun provides the fastest method of adjusting fire for the recoilless rifle. When a spotting round strikes the desired point of impact on the target (gunner should always relay during time of flight of the spotter projectile), the recoilless rifle may be fired immediately.

Section II. APPARENT SPEED ESTIMATION AND LEAD DETERMINATION

5–4. General

Apparent speed estimation is related to lead determination. The primary method of determining leads for the recoilless rifle is to estimate the apparent speed of the target and convert this apparent speed to leads. The spotting gun is fired and necessary adjustments are made until the target is hit.

5–5. Apparent Speed Estimation

Speed at which a target appears to move toward or away from the line of sight is called apparent speed. It is determined by establishing a line of sight and then estimating the target's speed as it moves toward or away from this line of sight. In figure 5–7, tank A has no apparent speed no matter how fast it is moving, because it is moving directly toward the gunner. The same applies if the tank is moving directly away from the gunner. Tank B has an apparent speed equal to its actual speed, because it is moving perpendicular to the gunner's line of sight. Tank C, moving at the oblique, has an apparent speed less than its actual speed. Constant practice is the only method by which a gunner can estimate apparent speed proficiently.

5–6. Lead Estimation

a. A moving target is led by the distance it travels from the time the rifle is fired until the projectile crosses the path of the target. When angular leads are measured with the direct fire sights, M92D and M92F, 5 miles per hour of apparent speed equals one lead. The number of leads applied varies with the apparent speed of the target, not with the range.

b. Ballistic characteristics of both the spotting gun and the rifle are such that one lead is applied on the sight reticle for each 5 miles per hour of apparent speed of the target. Once the correct number of leads (to hit the moving target) is determined with the spotting gun, the gunner uses the same sight picture in engaging the target with the recoilless rifle.

c. An alternate means of determining leads for untrained men is the common lead rule. The telescopic sight provides a measure of angular leads. The number of leads required is based on the direction the target is moving in relation to the gun position (fig 5–8). On the battlefield, all tracked vehicles are considered to move at an actual speed of 15 miles per hour. If the target is moving directly toward or away from the gun position, no leads are required. If the target is moving from one or eleven o'clock, one lead is used; from two or ten o'clock, two leads; and from three or nine o'clock, three leads.

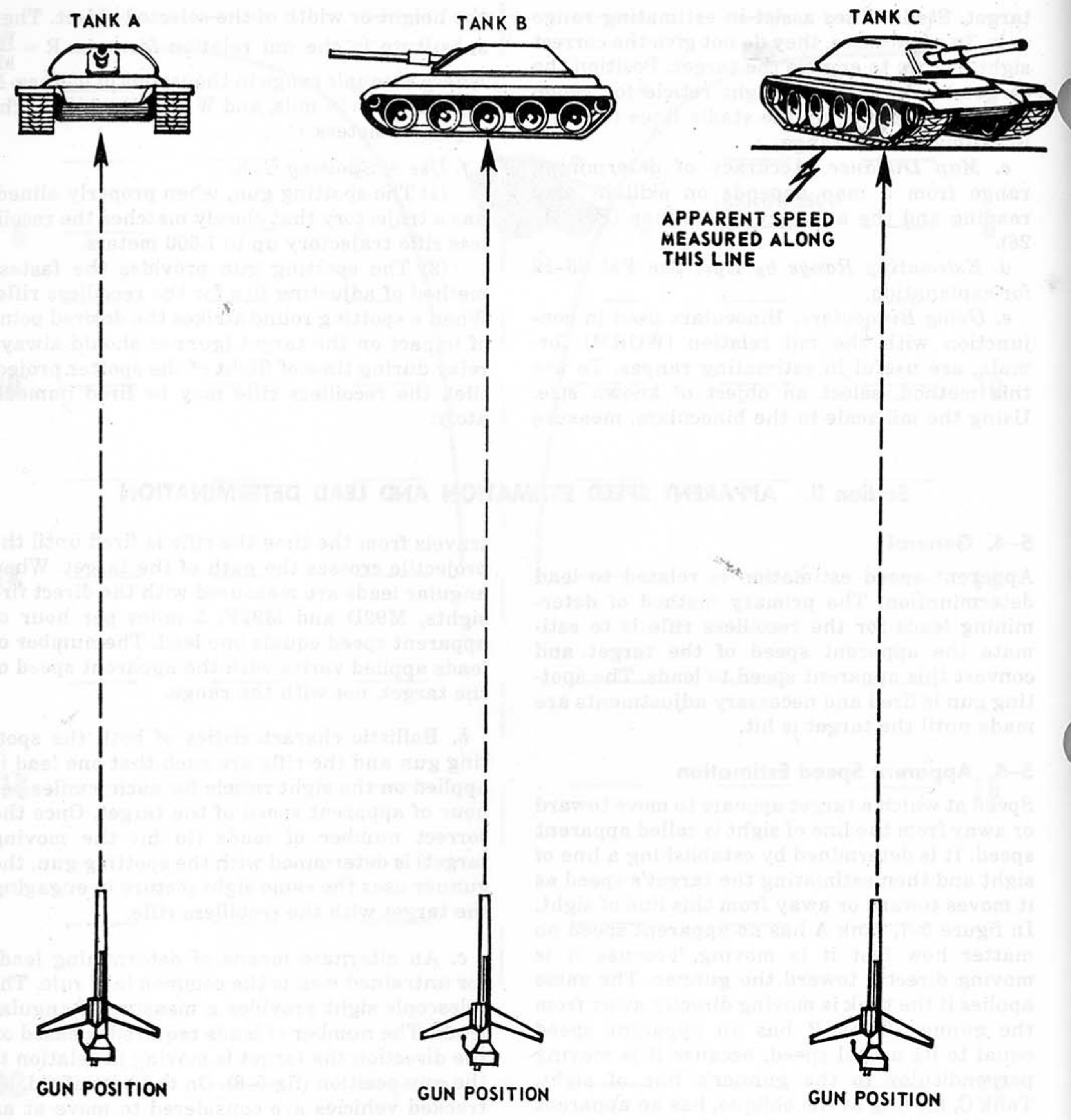


Figure 5-7. Determining apparent speed.

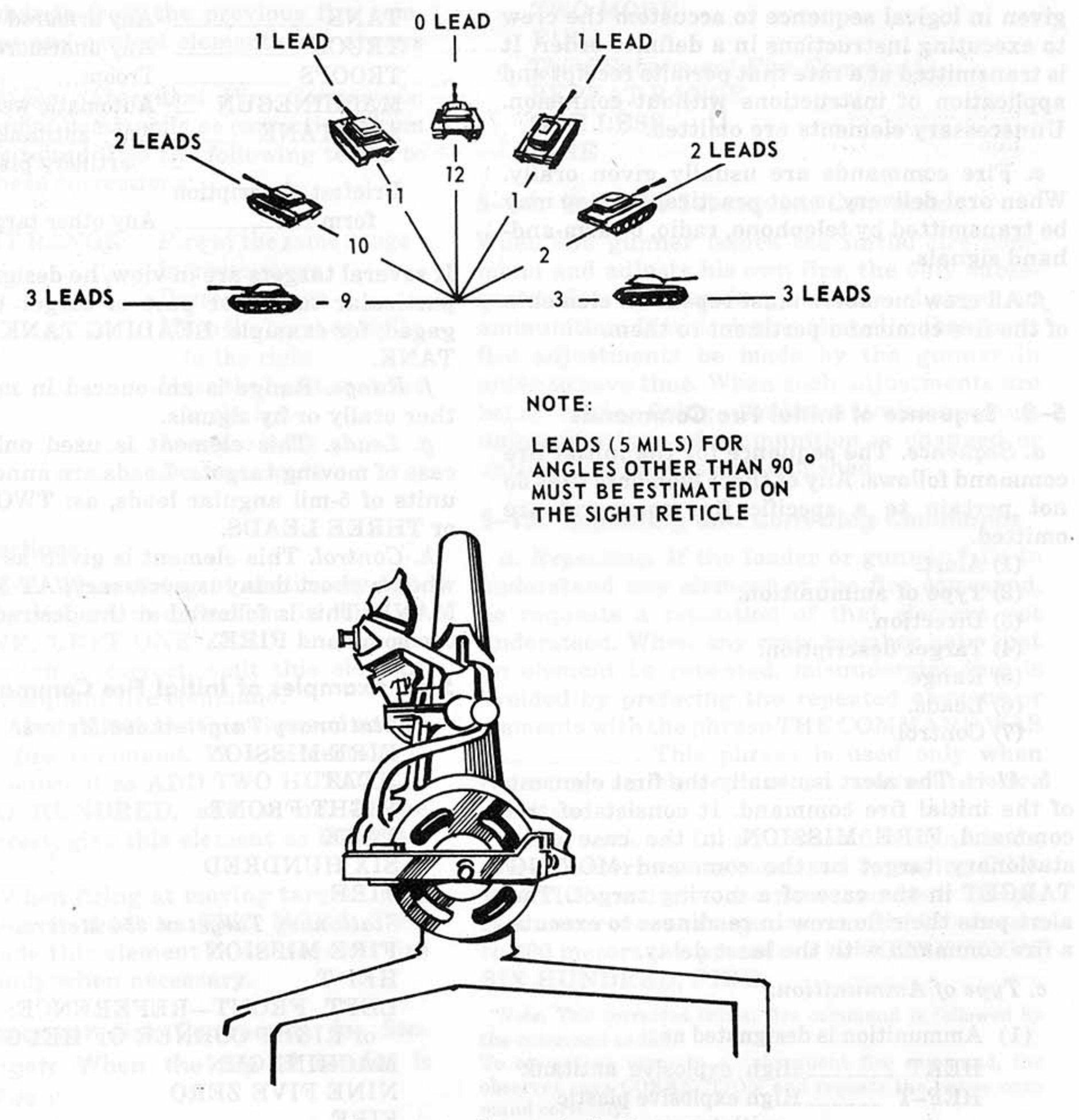

1 LEAD
0 LEAD
1 LEAD
2 LEADS
2 LEADS
3 LEADS
3 LEADS
12
11
10
9
1
2
3
NOTE:
LEADS (5 MILS) FOR ANGLES OTHER THAN 90 ° MUST BE ESTIMATED ON THE SIGHT RETICLE

Figure 5-8. Common lead rule.

Section III. FIRE COMMANDS

5-7. General

a. Fire commands are instructions given to enable a weapons crew to engage a target. The squad leader normally issues the fire commands. In some cases, however, the time available may require the gunner to give an abbreviated command. In either case, a standard sequence is followed.

b. Training in fire commands is to develop squad proficiency to such a degree that all fire, after the initial shot, can be adjusted without command from the squad leader until the target is destroyed or the squad leader decides to resume adjustment.

c. There are two kinds of fire commands: *initial* and *subsequent*. *Initial* fire commands include data for laying, loading, and firing the weapon. *Subsequent* fire commands include those commands given to adjust, shift, cease, or suspend fire. They normally include only those elements necessary to accomplish these actions.

d. A correct fire command is as brief as clarity permits. It includes all the elements needed to accomplish the fire mission and is ven in logical sequence to accustom the crew executing instructions in a definite order. It transmitted at a rate that permits receipt and pplication of instructions without confusion. nnecessary elements are omitted.

e. Fire commands are usually given orally. hen oral delivery is not practicable, they may transmitted by telephone, radio, or arm-and-and signals.

f. All crew members must repeat all elements the fire command pertinent to them.

-8. Sequence of Initial Fire Commands

a. Sequence. The sequence for the initial fire ommand follows. Any of these elements that do ot pertain to a specific fire command are mitted.

(1) Alert.
(2) Type of ammunition.
(3) Direction.
(4) Target description.
(5) Range.
(6) Leads.
(7) Control.

b. Alert. The alert is usually the first element the initial fire command. It consists of the ommand FIRE MISSION in the case of a ationary target or the command MOVING ARGET in the case of a moving target. The ert puts the rifle crew in readiness to execute fire command with the least delay.

c. Type of Ammunition.

(1) Ammunition is designated as:

HEAT	High explosive antitank
HEP–T	High explosive plastic with tracer
APERS–T	Antipersonnel with tracer

(2) This element is announced immediately fter the alert. As soon as it is announced, the oader loads the proper ammunition into the iece.

d. Direction. Direction may be given orally, y pointing, or by a combination of these methds. The squad leader may use a reference point n designating those targets that are difficult or the gunner to locate. The clock system of ndicating direction may also be used.

e. Target Description. Targets are described s quickly and simply as is consistent with larity. The squad leader uses the following word or words to designate targets:

TANK	Any armored vehicle
TRUCK	Any unarmored vehicle
TROOPS	Troops
MACHINEGUN	Automatic weapon
ANTITANK	Any antitank gun or artillery piece
Briefest description form	Any other target

If several targets are in view, he designates the particular target or part of target to be engaged; for example: LEADING TANK or LAST TANK.

f. Range. Range is announced in meters, either orally or by signals.

g. Leads. This element is used only in the case of moving targets. Leads are announced in units of 5-mil angular leads, as: TWO LEADS or THREE LEADS.

h. Control. This element is given as FIRE or when a short delay is necessary, AT MY COMMAND. This is followed at the desired time by the command FIRE.

5–9. Examples of Initial Fire Commands

a. Stationary Target at 600 Meters.

FIRE MISSION
HEAT
RIGHT FRONT
TANK
SIX HUNDRED
FIRE

b. Stationary Target at 950 Meters.

FIRE MISSION
HEP-T
LEFT FRONT—REFERENCE: HEDGE or RIGHT CORNER OF HEDGE
MACHINEGUN
NINE FIVE ZERO
FIRE

c. Moving Target at 800 Meters and 15 Miles Per Hour Apparent Speed.

MOVING TARGET
HEAT
FRONT
TRUCK
EIGHT HUNDRED
THREE LEADS
FIRE

5–10. Subsequent Fire Commands

a. Sensing. In direct fire, sense each round or burst (caliber .50 spotting gun and recoilless rifle) for deflection and range. Do not announce either sensing. See paragraph 5–20 for a discussion of sensing and conduct of fire.

b. Elements. A subsequent fire command usually includes only those elements for which there is a change from the previous fire command. Range and control elements are always included.

c. Announcing Subsequent Fire Commands. Give subsequent commands as corrections from the previous round. Use the following terms to announce these corrections:

REPEAT RANGE	Fire at the same range
ADD	Increase range
DROP	Decrease range
RIGHT	Move the burst or strike to the right
LEFT	Move the burst or strike to the left
MORE	Increase leads
LESS	Decrease leads

5–11. Corrections

a. Deflection. When firing at stationary targets, give corrections in deflection (in mils) as RIGHT FIVE, LEFT ONE ZERO, and so on. When deflection is correct, omit this element from the subsequent fire command.

b. Range. Always include this element in the subsequent fire command. If a correction is needed, announce it as ADD TWO HUNDRED, DROP TWO HUNDRED, and so on. If the range is correct, give this element as REPEAT RANGE.

c. Leads. When firing at moving targets, give the correction in leads as TWO MORE, TWO LESS. Include this element in subsequent fire commands only when necessary.

5–12. Subsequent Fire Commands for Stationary Targets When the Squad Leader Is Adjusting Fire

a. First Subsequent Fire Command.

LEFT FIVE
DROP TWO HUNDRED
FIRE

b. Second Subsequent Fire Command.

RIGHT FIVE
ADD ONE HUNDRED
FIRE

5–13. Subsequent Fire Commands for Moving Targets When the Squad Leader Is Adjusting Fire

a. First Subsequent Fire Command.

DROP TWO HUNDRED
ONE LESS
FIRE

b. Second Subsequent Fire Command.

ADD ONE HUNDRED
TWO MORE
FIRE

c. Third Subsequent Fire Command.

REPEAT RANGE
ONE LESS
FIRE

5–14. Gunner's Subsequent Commands

When the gunner issues the initial fire command and adjusts his own fire, the only subsequent fire commands given are changes in ammunition. It is desirable that all subsequent fire adjustments be made by the gunner in order to save time. When such adjustments are being made, firing continues uninterrupted, unless the type of ammunition is changed or until the mission is accomplished.

5–15. Repeating and Correcting Commands

a. Repeating. If the loader or gunner fails to understand any element of the fire command, he requests a repetition of that element not understood. When any crew member asks that an element be repeated, misunderstanding is avoided by prefacing the repeated element or elements with the phrase THE COMMAND WAS ________. This phrase is used only when repeating an element of an unexecuted fire command.

b. Corrections. In all initial fire commands, correct an erroneous command by saying CORRECTION and give the new command. To correct an erroneous range command of 500 meters to 600 meters the procedure is: CORRECTION, SIX HUNDRED, FIRE.

Note. The corrected initial fire command is followed by the command to fire.
To correct an error in a subsequent fire command, the observer says CORRECTION and repeats the entire command correctly.

5–16. Cease, Suspend, and Commence Firing

CEASE FIRING is announced when the squad leader wants to interrupt firing for any reason. It indicates the completion of firing with the data in the gunner's possession. Firing is then renewed by an initial fire command. SUSPEND FIRING is the command for a temporary halt in firing a particular mission. Given COMMENCE FIRING after SUSPEND FIRING, the squad continues to fire the mission under the previous fire command.

5–17. Termination of Alert

Termination of the alert is announced as CEASE FIRING, END OF MISSION. If oral commands are not practical, hand-and-arm signals may be used.

Section IV. FIRE CONTROL

5–18. General

Fire control implies the ability of a leader to open fire at the instant he desires, adjust the fire of his rifle or rifles upon the target, shift fire from one target to another, regulate the rate of fire, and cease firing at will. A leader must accomplish these promptly if the fire is to be effective. Lack of good fire control results in loss of surprise effect, premature disclosure of position, and fire on unimportant targets. It also results in a loss of time in securing adjustment and a waste of ammunition. Fire control depends on the discipline, technical training, and initiative of squad members. Because of noise, semi-isolation of firing positions, limited vision, and fleeting opportunity, fire control must be simple.

5–19. Chain of fire control

The commander responsible for employment of the 106-mm recoilless rifles issues the necessary orders directly to the platoon leader. The platoon leader, in turn, gives his orders to his squad leaders. The squad leader is responsible for control of the squad and the accomplishment of its mission.

5–20. Adjustment of Fire

a. General. Adjustment of fire is an important phase of fire control. If a first round hit is not achieved, rapid adjustments of fire are made with subsequent rounds. Several different methods are used depending on range, visibility, and type of ammunition fired. These methods are grouped into three general categories: spotting gun method, burst-on-target method, and observation-of-tracer method.

b. Spotting Gun Method.

(1) This is the primary method of fire adjustment up to 1100 meters. With a well-trained gunner it is the most accurate and rapid method of fire adjustment.

(2) The gunner fires the spotting gun. He notes the point on the sight reticle where the burst appears (fig 5-9) and adjusts the lay of the weapon until that point appears to be centered on the target's visible center of mass (fig 5-10). He again fires the spotting gun. This should give him a target hit. If so, he immediately fires the major caliber round.

(3) If the projectile passes over the target, the gunner will use the observation-of-tracer method. This technique is essentially the same as for the burst-on-target method; the only difference is that if the tracer passes beyond the target, the gunner does not sense the burst. Instead, he senses the point on his reticle where the tracer passed over the target and moves this point on the reticle (by adjusting the lay of the weapon) to the target's center of visible mass to fire his next round.

c. Burst-on-Target Method.

(1) This method may be used when the spotting gun is inoperative or the range is greater than 1,100 meters but not more than 2,400 meters. When possible, the gunner will adjust his own fire. If the gunner should miss the target with the first round, he adjusts the lay of the weapon until that portion of the sight reticle where the round appeared to impact is at the target's center of mass. He will then fire his second round. To select this point, the gunner chooses a lead line, a range graduation, or interpolates between lines. A failure to hit with the second round indicates an inaccurate movement of the center of burst (point of impact). Should the gunner fail to get a hit with his second round, he repeats the process, moving the new center of burst to the center of the target by manipulation of the elevating and traversing mechanisms.

(2) If the gunner cannot observe his burst, the direct method of adjustment may be used by the squad leader. This method requires the squad leader to sense the burst and give subsequent fire commands.

(*a*) For projectiles that fall short of the target, the squad leader estimates the distance between the burst on the ground and the target. He then measures half the height of the target in mils and converts these mils into meters (see *d*(2)(*c*) below; for example, see figure 5–11); C = 3, therefore, 2 mils ($\frac{1}{2}$ height of target) = $66\frac{2}{3}$ meters (rounding off to nearest 25 meters = 75 meters). He adds this change to the distance the projectile fell short of the target. Subsequent command: ADD ONE FIVE ZERO, FIRE.

(*b*) For projectiles (HEAT) that pass over the target, the squad leader gives the gunner a subsequent fire command of not more than a 200 meter range change. If the second round falls short of the target, the squad leader uses the method of adjustment as prescribed above.

d. Observation-of-Tracer Method.

(1) *Adjustment by gunner.* When the gunner is adjusting his own fire on a target firing HEP–T ammunition, he employs the observation-of-tracer method of fire adjustment. This method is essentially the same as the burst-on-target method; the only difference is that if the

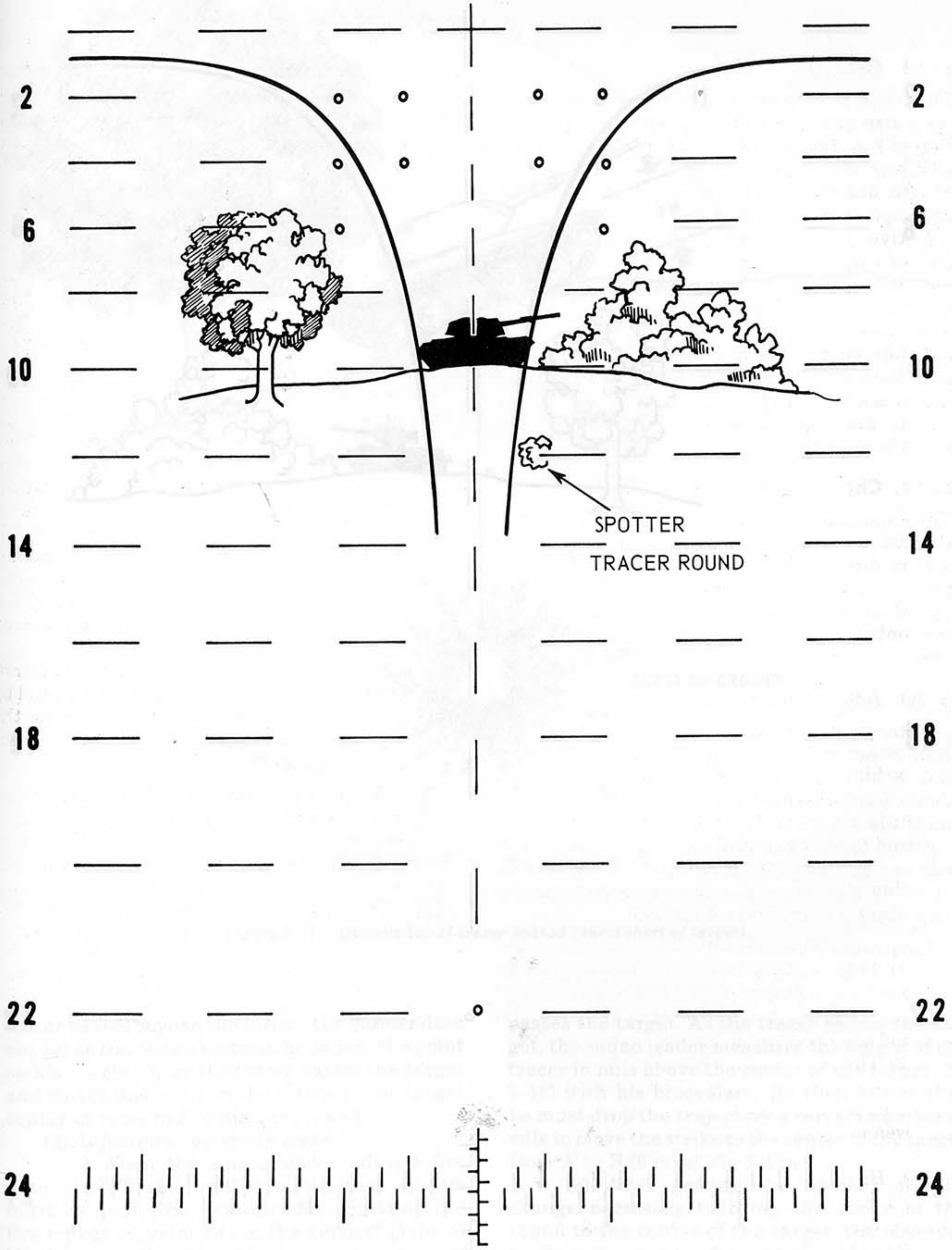


Figure 5–9. Burst-on-target method (note impact point).

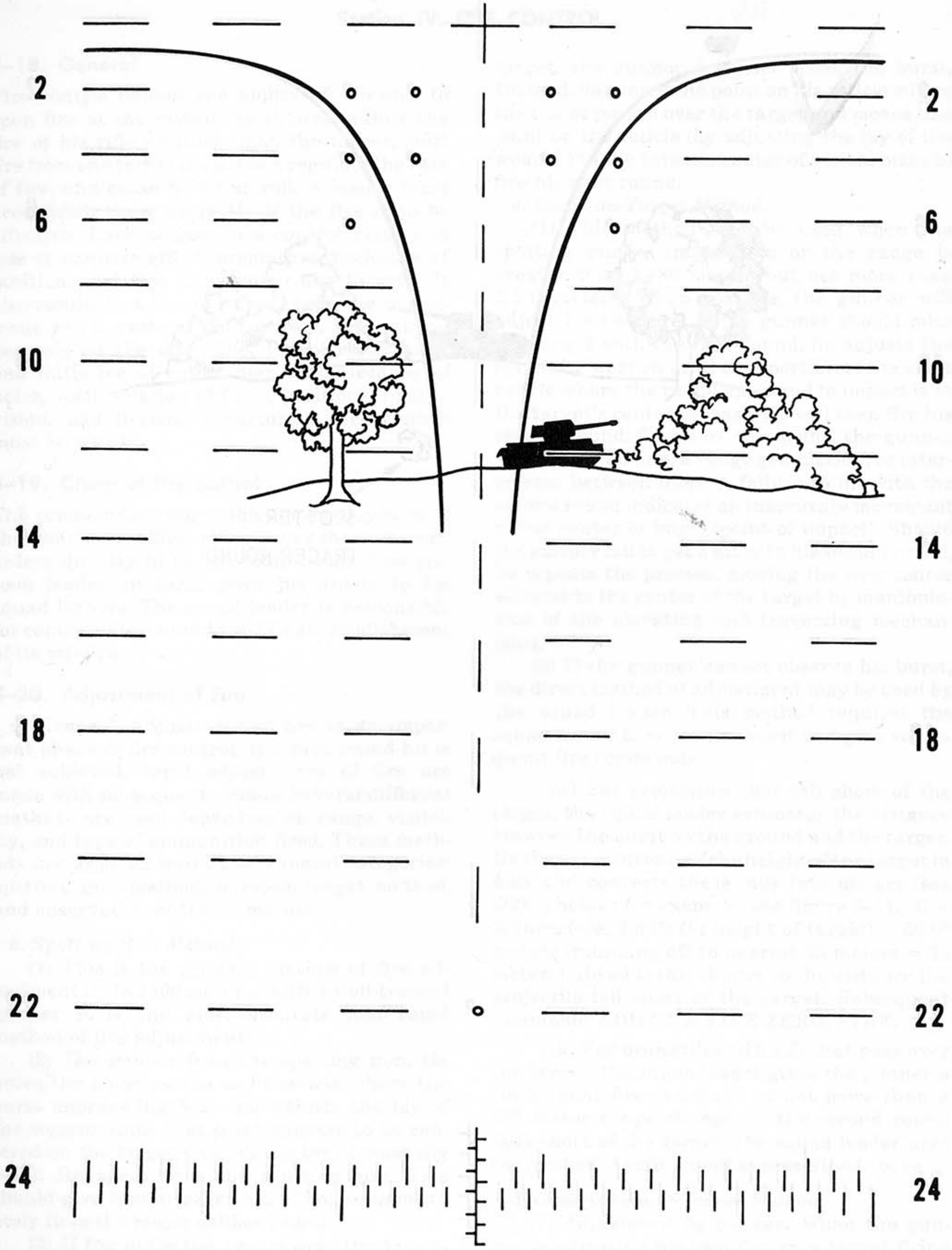


Figure 5–10. Burst-on-target method (adjustment of aiming point).

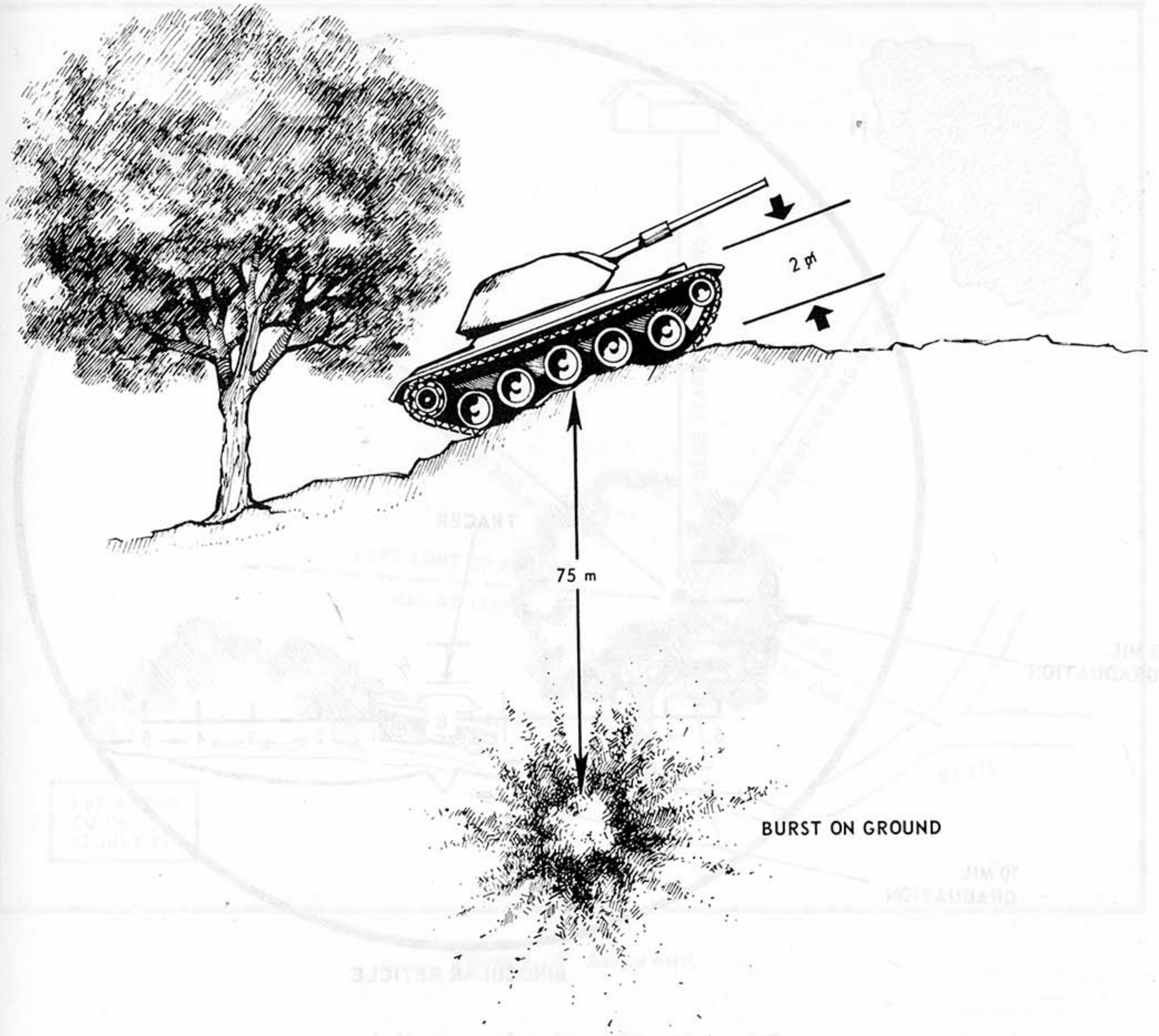


Figure 5–11. Observation-of-tracer method (burst short of target).

tracer passes beyond the target, the gunner does not sense the burst. Instead, he senses the point on his reticle where the tracer passes the target and moves this point on the reticle to the target center of mass to fire his next round.

(2) *Adjustment by squad leader.*

(*a*) When the squad leader adjusts fire with HEP–T ammunition a different system must be used. The squad leader adjusting the fire makes adjustments in the vertical plane of the target rather than the horizontal plane of the ground.

(*b*) If the projectile passes beyond the target, he senses the point where the tracer passes the target. As the tracer passes the target, the squad leader measures the height of the tracer in mils above the center of the target (fig 5–12) with his binoculars. He then knows that he must drop the trajectory a certain number of mils to move the strike to the center of the target from A to B (6 mils) (fig 5–12).

(*c*) After getting the number of mils change necessary to bring the strike of the round to the center of the target, the observer needs some means of converting this into meters. Necessary conversion from mils to meters is made with a "C" factor. The "C" factor is the change in elevation in mils necessary for a 100

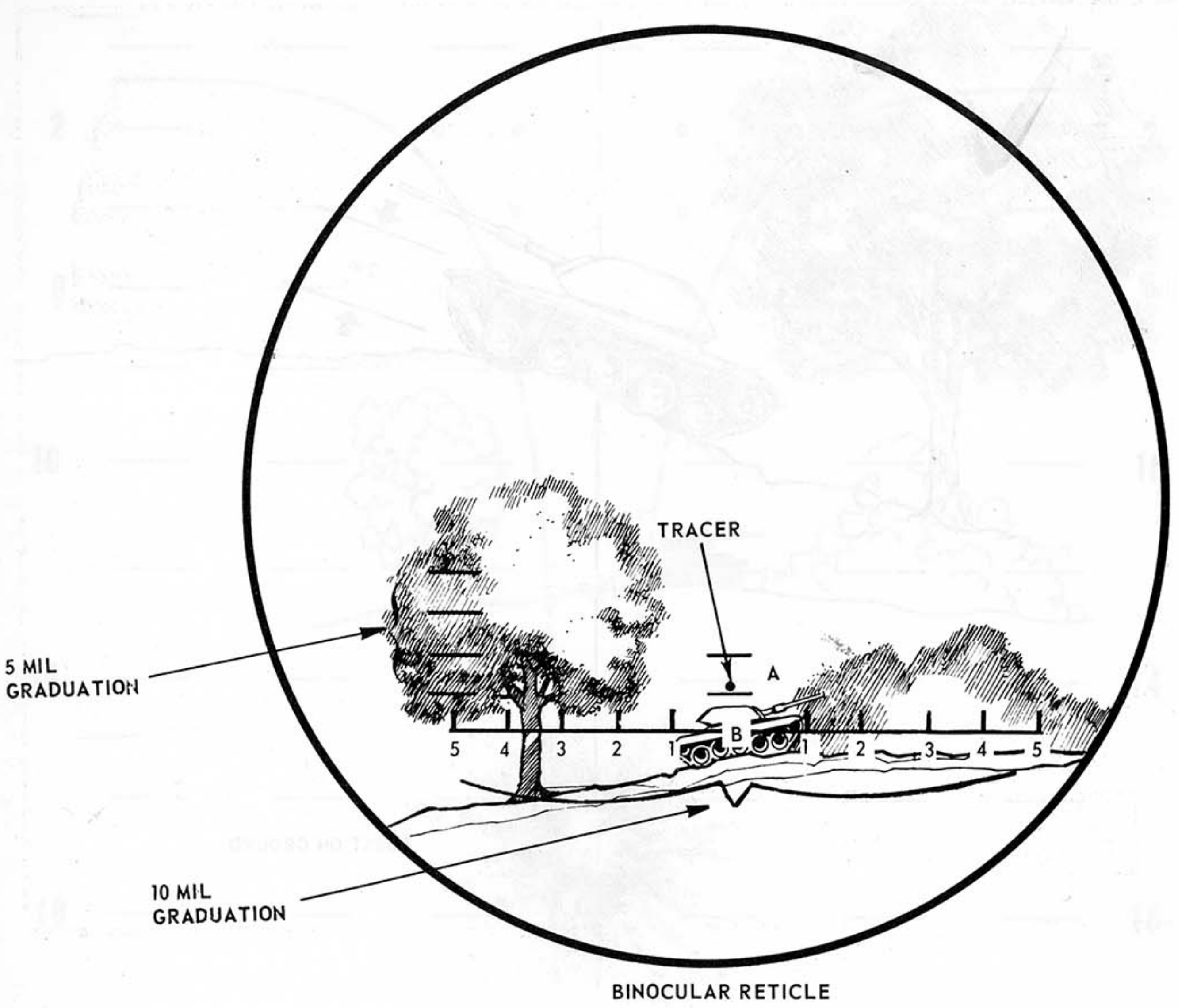


Figure 5-12. Observation-of-tracer method.

meter change in range on the ground. For the 106-mm recoilless rifle, "C" is about 3 mils for ranges from 0 to 2,400 meters.

(*d*) The observer now solves the adjustment problem for projectiles that pass over the target (fig 5-12). C = 3, or a 100 meter change in range will lower the strike 3 mils. The observer works the following problem mentally:

$$\frac{6 \not{m} \text{ (mils above center of target)}}{3 \not{m} \text{ ("C" factor)}} = \frac{6}{3} = 2$$

Hence, the range change is 200 meters. Subsequent command—DROP TWO HUNDRED, FIRE.

(*e*) For projectiles that land short of the target, use the method described in *c*(2)(*a*) above.

5-21. Overhead Fire

a. The 106-mm recoilless rifle is capable of accurate, safe, overhead fire except when firing the antipersonnel round. It provides the accuracy of a flat trajectory weapon which adjusts fire with a small spotter round.

b. The gunner is responsible for mask clearance. He establishes mask clearance for each round fired by checking his line of sight for obstructions. The line of sight is established by laying on the target with the proper sight picture to it. The weapon has mask clearance if the line of sight is unobstructed because the trajectory is above the line of sight.

c. Fire is lifted on the commander's order or when fire is masked.

Note. When employed in support of the rifle elements, the 106-mm recoilless rifle should be used against point targets and not as an area fire weapon.

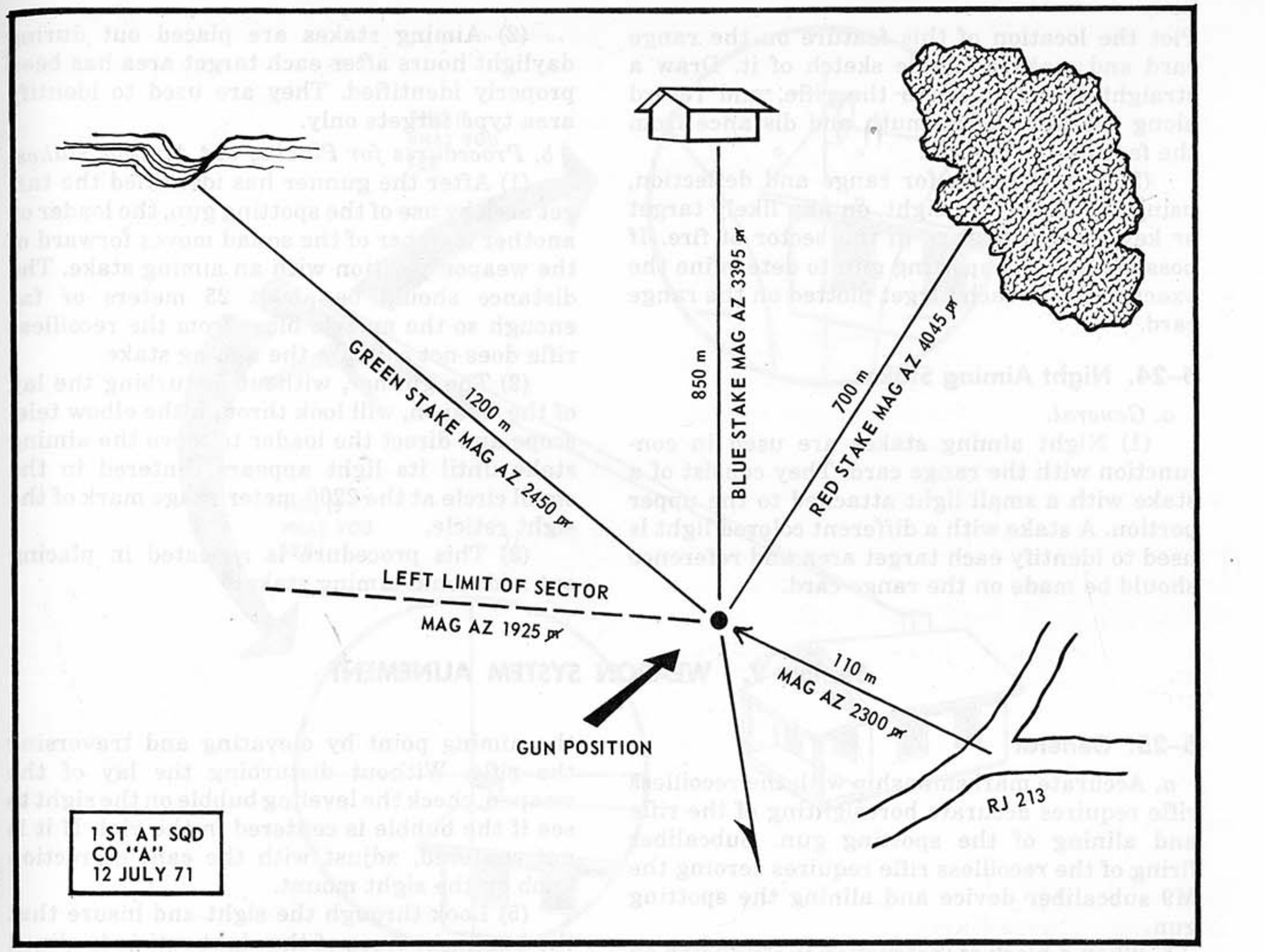


Figure 5-13. Range card.

5-22. Night firing techniques

The primary method of firing the weapon system during the hours of darkness is with artificial illumination. By using this method the procedures of fire adjustment as described in this manual remain the same. Means of providing artificial illumination are dependent upon the situation and availability. For means and methods of employing artificial illumination, see FM 20-60.

5-23. Range Cards

a. General.

(1) A range card (fig 5-13) is an oriented sketch prepared for each rifle. It shows the position of the rifle, magnetic north, ranges, elevations, and directions to prominent terrain features and probable targets. By showing the ranges and directions to nearby objects, it enables the rifle crew to determine quickly and accurately the data necessary to engage any target in the sector.

(2) Range cards make it possible to fire during periods of limited visibility and to transfer available information to men of the relieving unit. The next higher command sometimes uses these range cards in coordinating fires. Make the range card in at least two copies and send one to the next higher unit.

b. Construction of Range Cards.

(1) Write the unit designation and the date in one corner of a piece of paper of suitable size. Next, place a dot in the approximate center of the piece of paper to denote the rifle position. Draw a straight line through the dot to represent magnetic north and so label the line. Identify the rifle position in relation to some prominent terrain feature by determining the magnetic azimuth from the terrain feature to the rifle. Ascertain the distance between them.

Plot the location of this feature on the range card and make a simple sketch of it. Draw a straight line from it to the rifle, and record along the line the azimuth and distance from the feature to the rifle.

(2) Lay the rifle for range and deflection, using the direct fire sight, on any likely target or key terrain feature in the sector of fire. If possible, use the spotting gun to determine the exact range to each target plotted on the range card.

5–24. Night Aiming Stakes

a. General.

(1) Night aiming stakes are used in conjunction with the range card. They consist of a stake with a small light attached to the upper portion. A stake with a different colored light is used to identify each target area and reference should be made on the range card.

(2) Aiming stakes are placed out during daylight hours after each target area has been properly identified. They are used to identify area type targets only.

b. Procedures for Placing out Aiming Stakes.

(1) After the gunner has identified the target area by use of the spotting gun, the loader or another member of the squad moves forward of the weapon position with an aiming stake. The distance should be about 25 meters or far enough so the muzzle blast from the recoilless rifle does not collapse the aiming stake.

(2) The gunner, without disturbing the lay of the weapon, will look through the elbow telescope and direct the loader to move the aiming stake until its light appears centered in the small circle at the 2200-meter range mark of the sight reticle.

(3) This procedure is repeated in placing out additional aiming stakes.

Section V. WEAPON SYSTEM ALINEMENT

5–25. General

a. Accurate marksmanship with the recoilless rifle requires accurate boresighting of the rifle and alining of the spotting gun. Subcaliber firing of the recoilless rifle requires zeroing the M9 subcaliber device and alining the spotting gun.

b. When a block of instruction is conducted on weapon system alinement, each soldier is allowed enough ammunition (zeroing, alinement, and confirmation table (para 7–1*d*) for the practical exercise.

5–26. Procedure

a. Boresighting.

(1) Four notches, 90 degrees apart, are located on the muzzle of the rifle. Stretch two pieces of thread or some similar material across opposite notches. The point of intersection marks the axis of the bore at the muzzle end of the weapon.

(2) Insert a boresight disc, issued with each weapon, in the chamber to mark the axis of the bore at the breech.

(3) If the boresight disc is not available, use a piece of cardboard with a small center hole. Another expedient is to insert the breechblock into the chamber after removing the firing pin so that the axis of the bore at the breech is defined by the firing pin hole in the breechblock.

(4) Select an aiming point beyond the range to any likely target. With the eye several inches behind the breech, aline the axis of the bore on the aiming point by elevating and traversing the rifle. Without disturbing the lay of the weapon, check the leveling bubble on the sight to see if the bubble is centered in the vial. If it is not centered, adjust with the cant correction knob on the sight mount.

(5) Look through the sight and insure that the boresight cross of the sight reticle is alined on the same aiming point. If the boresight cross is not alined, bring it to the aiming point by rotating the elevation or azimuth adjustment screws with a screwdriver. Recheck the alinement; if the bore and the sight are properly alined on the aiming point, the rifle is boresighted (fig 5–14).

b. Alining the Caliber .50 Spotting Gun.

(1) The primary method of alining the spotting gun is to fire one HEAT or HEP–T round of ammunition at a target between the ranges of 1000 and 1200 meters (preferably 1100 meters). Then fire two rounds from the spotting gun with the same sight picture used in firing the service round. If the spotting rounds do not strike at the point of impact of the service round, adjust the spotting gun, moving the strike of its round to coincide with the center of burst of the service round. Adjust the spotting gun by rotating the elevation and azimuth cams on the front mounting bracket. To make this adjustment, use the spotting gun adjusting wrench, which depresses the retaining springs and allows the cams to be turned until the mil correction has been attained. (Always remove the magazine and clear the spotting gun before making adjustments on the front mounting bracket.) When the strike of the spotting round coincides with the center of burst of the service round, the weapon system is alined.

(2) The alternate method of alining the spotting gun is to select a target at a *known* range between 1000 and 1200 meters (preferably 1100 meters). Fire the spotting gun with the range increment of the sight in the reticle corresponding to the range of the target held on the target's center of mass. If the spotting round does not strike the target, adjust the spotting gun so the spotter-tracer round will strike the target's center of mass.

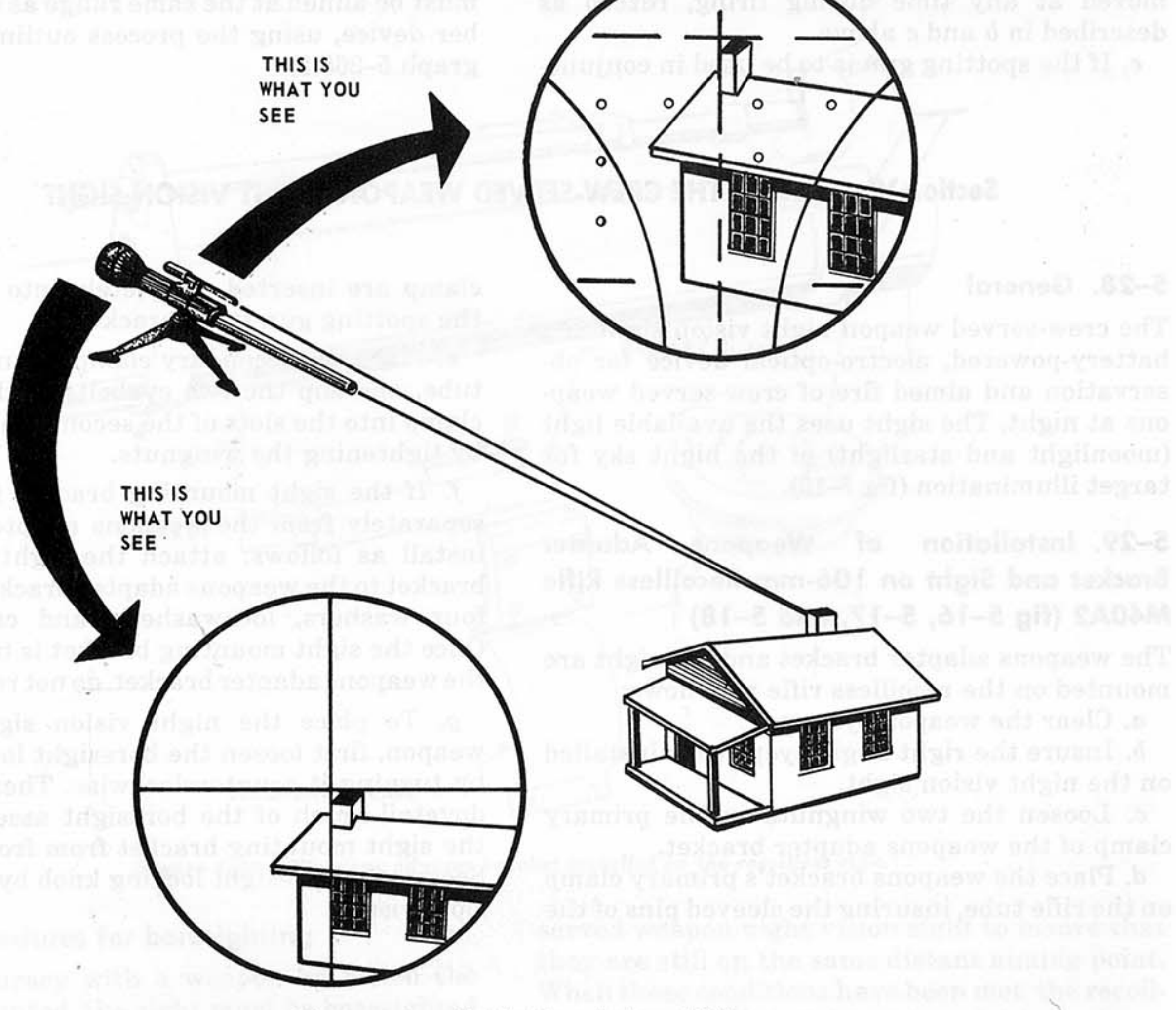


Figure 5–14. Sight picture in boresighting.

5–27. Zeroing the Subcaliber Device

a. To zero the subcaliber device, place it in the chamber of the recoilless rifle with the cutaway portion toward the extractor. Before insertion, insure that the locking nut is tight. Level the sight with the cant correction knob. Select a target at a *known* range between 600 and 800 meters (tracer burn-out range of caliber .30 tracer ammunition).

b. Adjust the lay of the weapon so the selected range line of the sight reticle appears to be at the target's center of mass and fire three caliber .30 rounds at the target. This will insure that the device is not zeroed with an erratic round. On 1000-inch targets, use the same procedure (600 meter line).

c. If the center of the shot group is not on the target, manipulate the weapon until the center of burst is at the target's center of visible mass. Move the selected range line by use of the boresight screws until it is laid on the target's center of mass. Fire a confirming round to insure the device is zeroed.

d. If the device is still not zeroed, repeat the process. Do not remove or disturb the subcaliber device during the procedure or after it has been completed. If the subcaliber device is moved at any time during firing, rezero as described in *b* and *c* above.

e. If the spotting gun is to be used in conjunction with a subcaliber device, the spotting gun must be alined at the same range as the subcaliber device, using the process outlined in paragraph 5-26*b*(2).

Section VI. USE OF THE CREW-SERVED WEAPON NIGHT VISION SIGHT

5–28. General

The crew-served weapon night vision sight is a battery-powered, electro-optical device for observation and aimed fire of crew-served weapons at night. The sight uses the available light (moonlight and starlight) of the night sky for target illumination (fig 5–15).

5–29. Installation of Weapons Adapter Bracket and Sight on 106-mm Recoilless Rifle M40A2 (fig 5–16, 5–17, and 5–18)

The weapons adapter bracket and the sight are mounted on the recoilless rifle as follows:

a. Clear the weapon system.

b. Insure the right angle eyepiece is installed on the night vision sight.

c. Loosen the two wingnuts on the primary clamp of the weapons adapter bracket.

d. Place the weapons bracket's primary clamp on the rifle tube, insuring the sleeved pins of the clamp are inserted completely into the slot of the spotting gun front bracket.

e. Place the secondary clamp around the rifle tube, and slip the two eyebolts of the primary clamp into the slots of the second clamp. Secure by tightening the wingnuts.

f. If the sight mounting bracket is received separately from the weapons adapter bracket, install as follows: attach the sight mounting bracket to the weapons adapter bracket with the four washers, lockwashers, and cap screws. Once the sight mounting bracket is installed on the weapons adapter bracket, do not remove it.

g. To place the night vision sight on the weapon, first loosen the boresight locking knob by turning it counterclockwise. Then slide the dovetail notch of the boresight assembly onto the sight mounting bracket from front to rear. Secure the boresight locking knob by turning it clockwise.

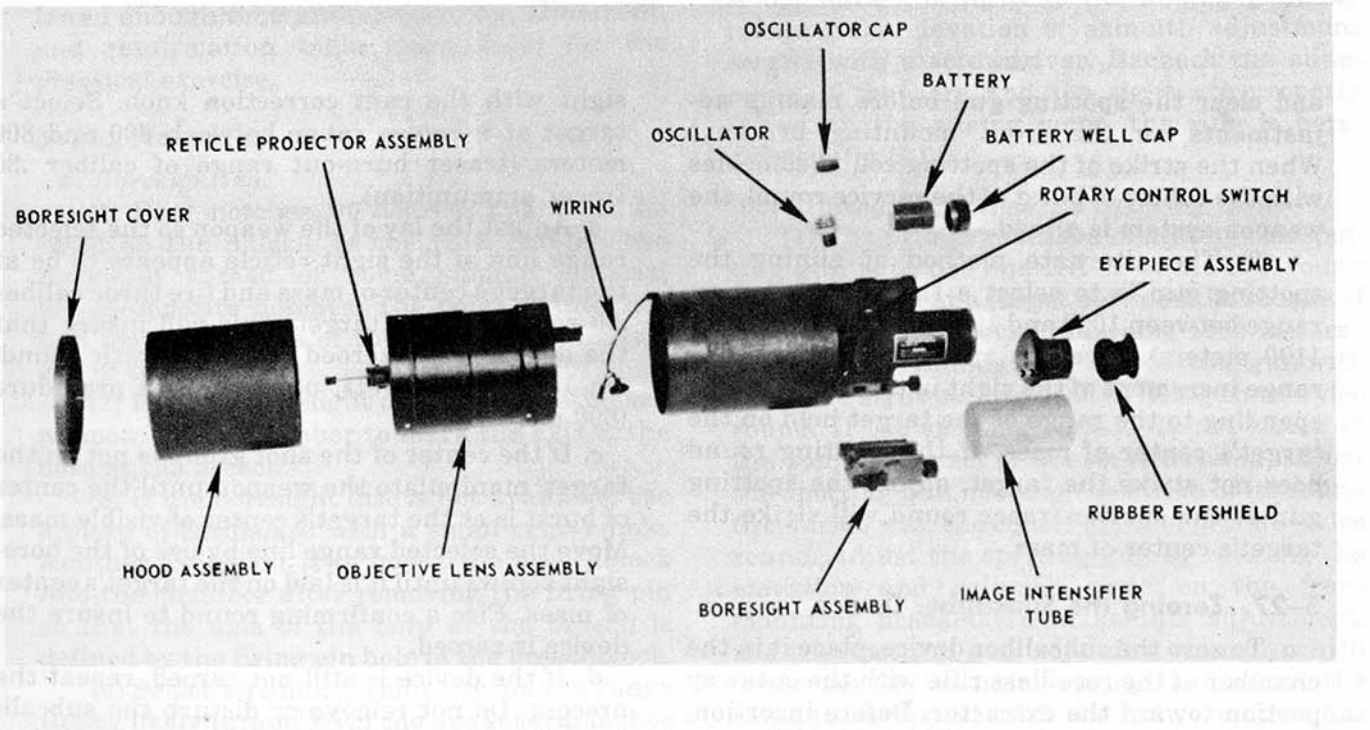


Figure 5–15. Crew-served weapon night vision sight.

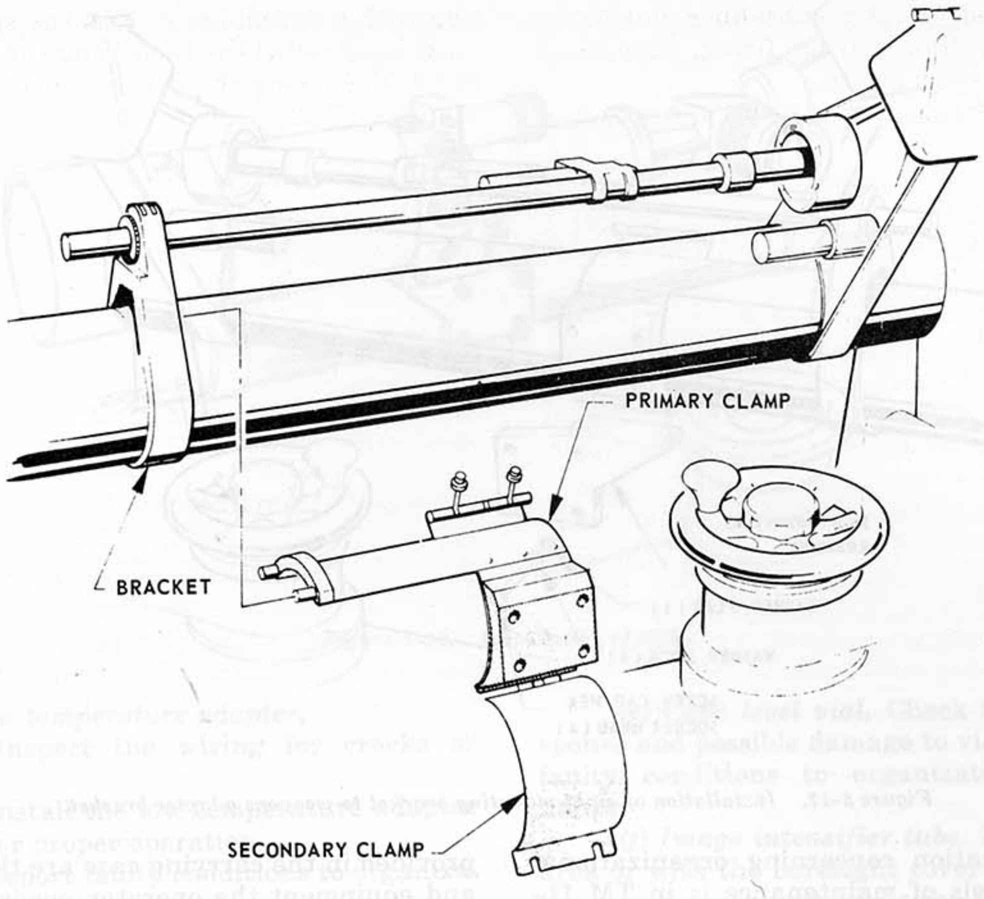


Figure 5–16. Weapons adapter bracket installed on the recoilless rifle.

5–30. Procedures for boresighting

To get accuracy with a weapon on which the sight is mounted, the sight must be boresighted to the weapon. Therefore, the gunner must know boresighting procedures.

a. Daylight Boresighting Procedure.

Caution: **Do not remove the lens cover during daylight hours.**

(1) Boresight and aline the weapon system as described in paragraph 5–26.

(2) Mount the sight as described in paragraph 5–29.

(3) Without disturbing the lay of the weapon, open the cant level view port and insure that the bubble is centered. If the bubble is not centered, center it with the cant correction knob.

Note. Later model devices do not have a cant level bubble.

(4) Insure the boresight cover is in place and turn the rotary control switch to the fourth stop position (Tube ON, Reticle ON). Aline the boresight dot of the reticle with the same distant aiming point by rotating the azimuth and elevation knobs on the boresight assembly.

Note. Later devices have only three positions.

(5) Recheck the alinement of the bore, the M92F (M92D) elbow telescope, and the crew-served weapon night vision sight to insure that they are still on the same distant aiming point. When these conditions have been met, the recoilless rifle and the night vision sight are boresighted.

(6) When the weapon system is alined and the night vision sight has been boresighted, sight on a target, using the night vision sight. Check alinement, using the spotting gun. Upon receiving a spotting round strike in the target's center of mass, the weapon system and crew-served sight are alined. If the spotting round does not strike the target's center of mass, make the proper adjustments on the azimuth and the elevation knobs on the sight.

b. Night Boresighting Procedure.

(1) Boresighting the night vision sight at night should be considered only as an alternate method.

(2) The procedures at night are the same as those used during daylight, except that the boresight cover is removed and a bright, distinct point, such as a star, is used for the distant aiming point.

5–31. Preventive Maintenance

This paragraph contains only that information the operator needs in order to maintain the

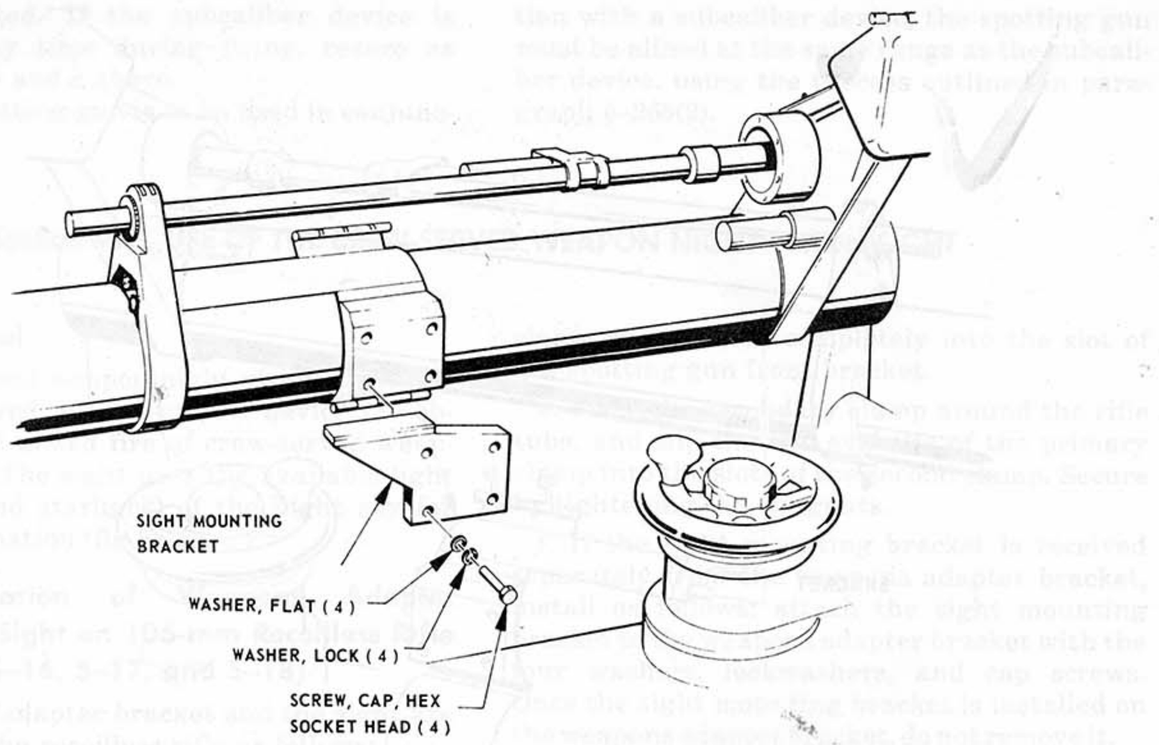


Figure 5–17. Installation of sight mounting bracket to weapons adapter bracket.

sight. Information concerning organizational or higher levels of maintenance is in TM 11–1090–269–15. Daily preventive maintenance must be performed in order to detect and to correct deficiencies in the sight, otherwise, it may be seriously damaged or fail to function (*b* below). When the equipment is stored in the shipping container, it must be cleaned and inspected weekly.

a. Cleaning Materials, Lubricants, Tools, and Equipment.

(1) *Cleaning materials.*

(*a*) Lens tissue paper is provided in the shipping container for cleaning all glass surfaces. Lens tissue can be requisitioned through supply channels; however, a soft, lint-free cloth may be used as a substitute.

(*b*) Use the lens brush furnished in the shipping container to remove excess dirt, grit, or sand from the glass surfaces.

(*c*) Use alcohol or distilled water with the lens tissue or lint-free cloth to remove grease or other foreign substances from the lenses.

(*d*) A damp cloth may be used to remove dirt or mud from the outer surface of the sight body.

(2) *Lubricants.* There are no lubrication requirements for the sight. The weapons adapter bracket requires a light coat of oil on exposed areas to prevent rust. For this purpose PL special or 10 W motor oil may be used.

(3) *Tools and equipment.* The accessories provided in the carrying case are the only tools and equipment the operator needs to perform maintenance on the sight.

b. Daily Preventive Maintenance. The operator performs the following daily maintenance.

(1) *Carrying case.*

(*a*) Inspect the carrying case for dents, holes, cracks, or dirt. If dirty, clean the case with a damp cloth.

(*b*) Check latches, carrying handles, and pressure relief valve for proper operation.

(*c*) Insure all components are present.

(*d*) Remove the sight and all accessories from the container, and inspect the foam rubber liners for damage. Remove accumulated dust and dirt with a damp cloth. If the liners are damp or wet, remove them and allow them to dry.

Note. The liners are force-fitted and are not glued or secured with screws. To remove from the container, grasp the liners with the hands and pull out. To replace the liners, insure that the cutaway portions match and force them into the container.

(2) *Components.*

(*a*) *Weapons adapter brackets.*

1. Inspect for the presence and free operation of the wingnuts and thumbscrews.

2. Inspect the dovetail notch for presence of the stop pin; check the shoulders of the dovetail for burrs.

3. Report faulty conditions to organizational maintenance.

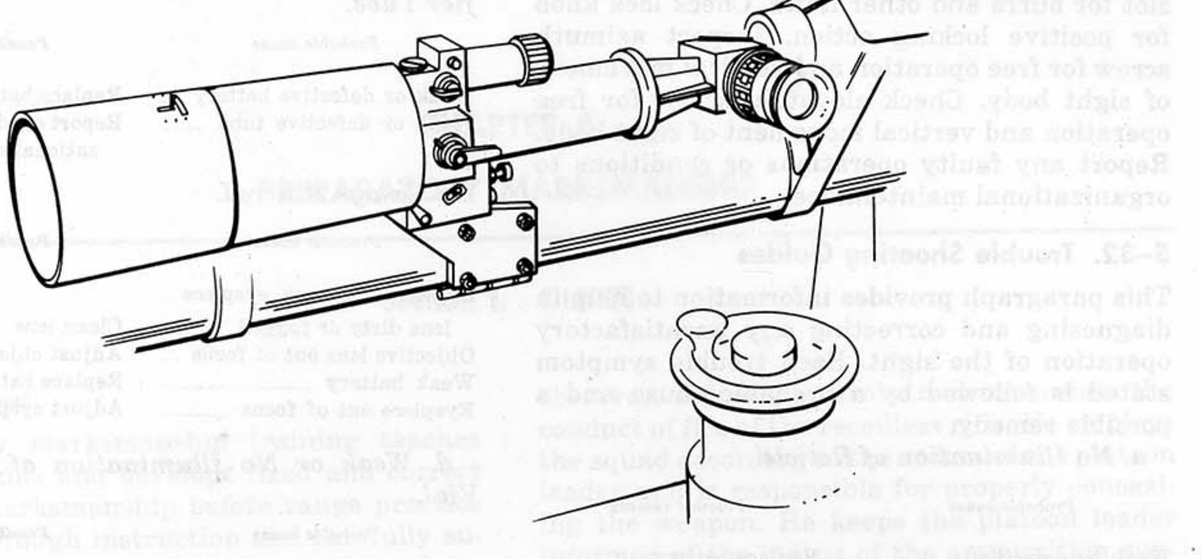


Figure 5–18. Installation of sight.

(*b*) *Low temperature adapter.*

1. Inspect the wiring for cracks or breaks.

2. Install the low temperature adapter and check for proper operation.

3. Report faulty conditions to organizational maintenance.

Note. Low temperature adapters are issued and used only in extreme cold climates.

(*c*) *Batteries.* Inspect for cracks or breaks in the battery bodies. If faulty, dispose of the batteries and requisition replacements through supply channels.

Caution: **Never burn batteries as they will explode and the fumes from the mercury cells are harmful to the eyes, nose, and respiratory system. To dispose of the batteries, bury or deposit in a large body of water.**

(3) *Crew-served weapon night vision sight.*

(*a*) *Sight body.* Inspect for dents, cracks, and dirt. If dirty, clean with a damp cloth; if cracked or dented, report faulty conditions to organizationl maintenance.

(*b*) *Objective lens assembly.* Inspect for scratches and dirt. If cracked or scratched, report faulty conditions to organizational maintenance. If dirty, clean with alcohol or distilled water and lens tissue or lint-free cloth.

(*c*) *Cant level vial lamp.* Open the cant level view port, turn the rotary control switch to the second stop position, and check for cant level illumination.

(*d*) *Cant correction knob.* Inspect for free operation and level vial response. Report any faulty conditions to organizational maintenance.

(*e*) *Cant level vial.* Check for bubble response and possible damage to vial. Report any faulty conditions to organizational maintenance.

(*f*) *Image intensifier tube.* In a darkened area or with the boresight cover in place, turn the rotary control switch to the third stop position and check for tube illumination (reticle should not be on in this position). If there is weak or no illumination, refer to paragraph 5–32 for corrective action.

(*g*) *Reticle intensity knob.* Turn the rotary control switch to the fourth stop position. Rotate the reticle intensity knob until the reticle pattern is clearly visible. If the reticle pattern cannot be seen, refer to paragraph 5–32 for corrective action.

(*h*) *Objective lens focus knob.* Inspect for free operation and image focusing. If the knob does not operate freely, report it to organizational maintenance.

(*i*) *Objective lens lock knob.* Check for positive locking action. Report any faulty operation to organizational maintenance.

(*j*) *Eyepiece assembly.* Inspect lens for cracks, scratches, and dirt. If dirty, clean with a lens brush or a lens tissue. If greasy, clean with alcohol, distilled water, and lens tissue or soft, lint-free cloth. Rotate the eyepiece focusing ring and check for free operation and focusing action. Report any faulty operation to organizational maintenance.

(*k*) *Rubber eyeshield.* Inspect for dirt. If dirty, clean with a damp cloth. If rubber is cracked or shows signs of deterioration, report the condition to organizational maintenance.

(*l*) *Boresight assembly.* Inspect dovetail slot for burrs and other flaws. Check lock knob for positive locking action. Inspect azimuth screw for free operation and vertical movement of sight body. Check elevation screw for free operation and vertical movement of sight body. Report any faulty operations or conditions to organizational maintenance.

5–32. Trouble Shooting Guides

This paragraph provides information to help in diagnosing and correcting any unsatisfactory operation of the sight. Each trouble symptom stated is followed by a probable cause and a possible remedy.

a. No Illumination of Reticle.

Probable cause	*Possible remedy*
Weak or defective	Replace battery
Defective reticle lamp	Replace lamp
Faulty wiring	Report condition to organizational maintenance

b. Weak or No Illumination of Image Intensifier Tube.

Probable cause	*Possible remedy*
Weak or defective battery	Replace battery
Weak or defective tube	Report condition to organizational maintenance.

c. Image Blurred.

Probable cause	*Possible remedy*
Objective lens or eyepiece lens dirty or fogged	Clean lens
Objective lens out of focus	Adjust objective lens knob
Weak battery	Replace battery
Eyepiece out of focus	Adjust eyepiece focus ring

d. Weak or No Illumination of Cant Level Vial.

Probable cause	*Possible remedy*
Weak or defective battery	Replace lamp
Faulty wiring	Report condition to organizational maintenance.

CHAPTER 6

PREPARATORY MARKSMANSHIP

Section I. DUTIES

6–1. General

Preparatory marksmanship training teaches essential skills and develops fixed and correct habits of marksmanship before range practice begins. Thorough instruction and carefully supervised practice in the preparatory phase saves time and ammunition during range firing and develops habits and procedures necessary for well-trained gun crews.

6–2. Duties of Squad Members

a. The squad leader is in command of the squad and is responsible for its equipment. He observes, adjusts, controls, and supervises the conduct of fire of the recoilless rifle. He employs the squad according to the orders of the platoon leader and is responsible for properly concealing the weapon. He keeps the platoon leader informed of the status of the ammunition supply and supervises his squad's ammunition resupply.

b. The loader's duties include loading the recoilless rifle, acting as gunner if needed, carrying ammunition, and checking clearance of the backblast area before firing.

c. The driver's duties include the mainte-

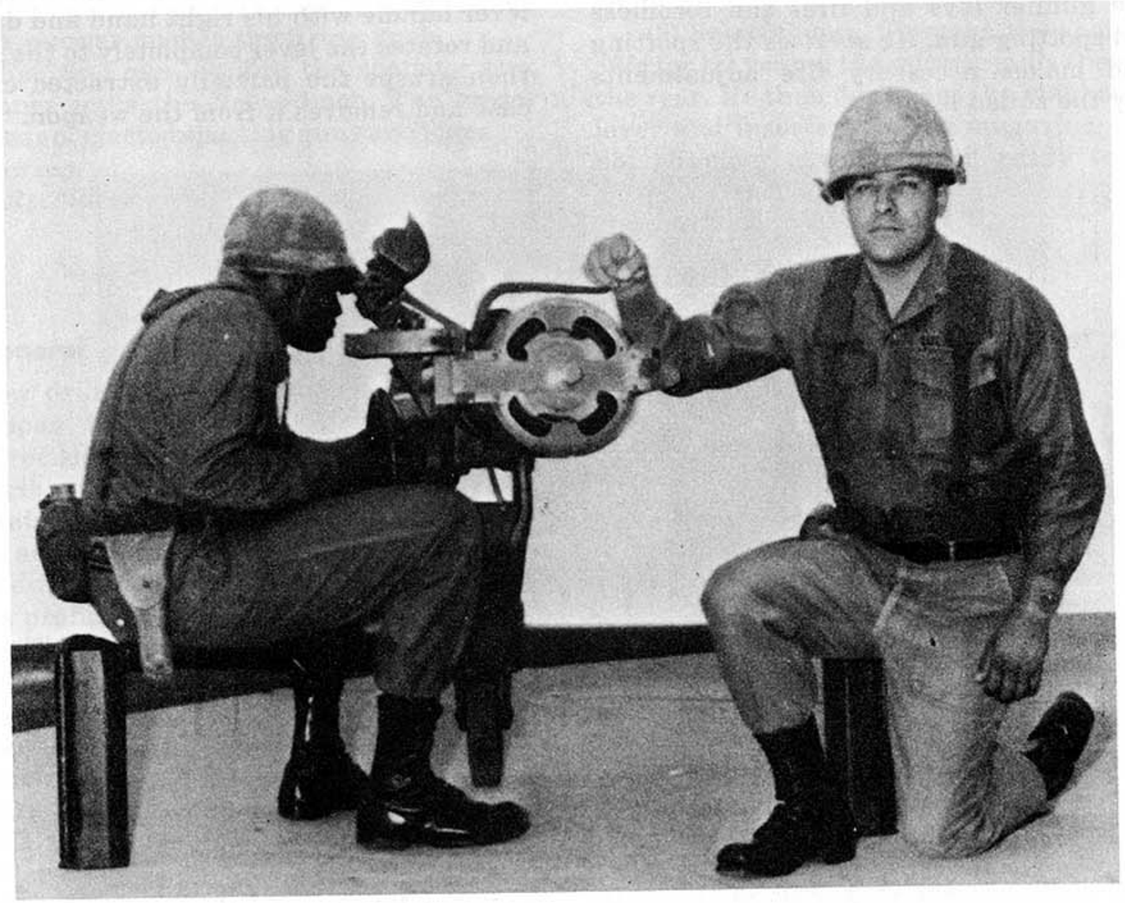


Figure 6–1. Opening the 106-mm recoilless rifle breech.

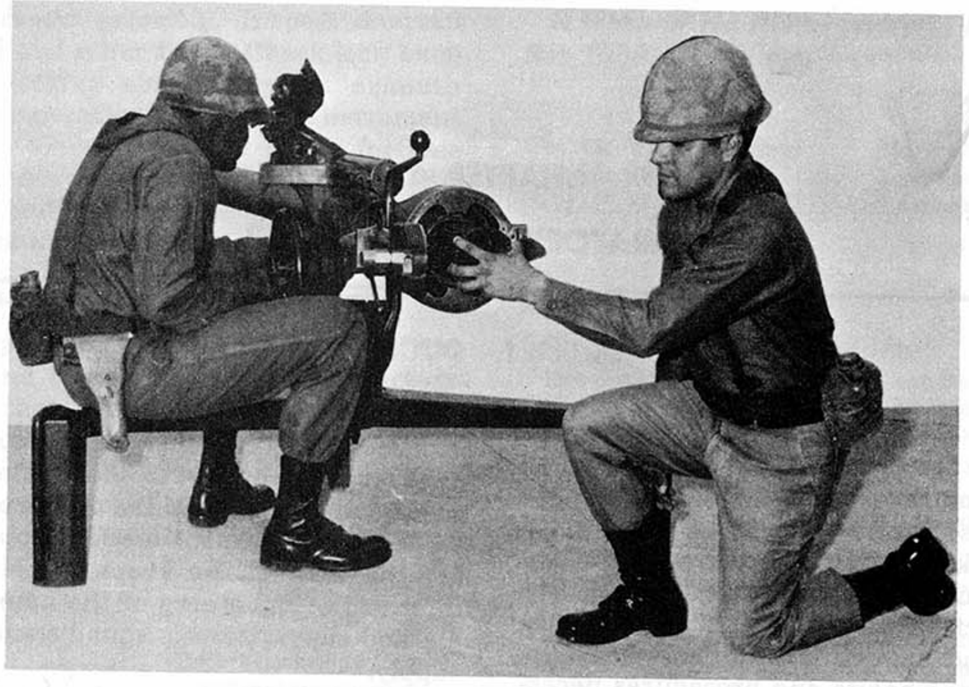


Figure 6–2. Extracting a fired cartridge case from the 106-mm recoilless rifle.

nance, concealment, and camouflage of his truck. He also assists in ammunition resupply with or without his truck.

d. The gunner lays and fires the recoilless rifle and spotting gun. He services the spotting gun and makes necessary fire adjustments called by the squad leader.

6–3. Service of the Piece

a. Unloading.

(1) *Recoilless rifle* (fig 6–1 and 6–2). To open the breech, the loader grasps the operating lever handle with his right hand and depresses and rotates the lever completely to the rear. He then grasps the partially extracted cartridge case and removes it from the weapon.

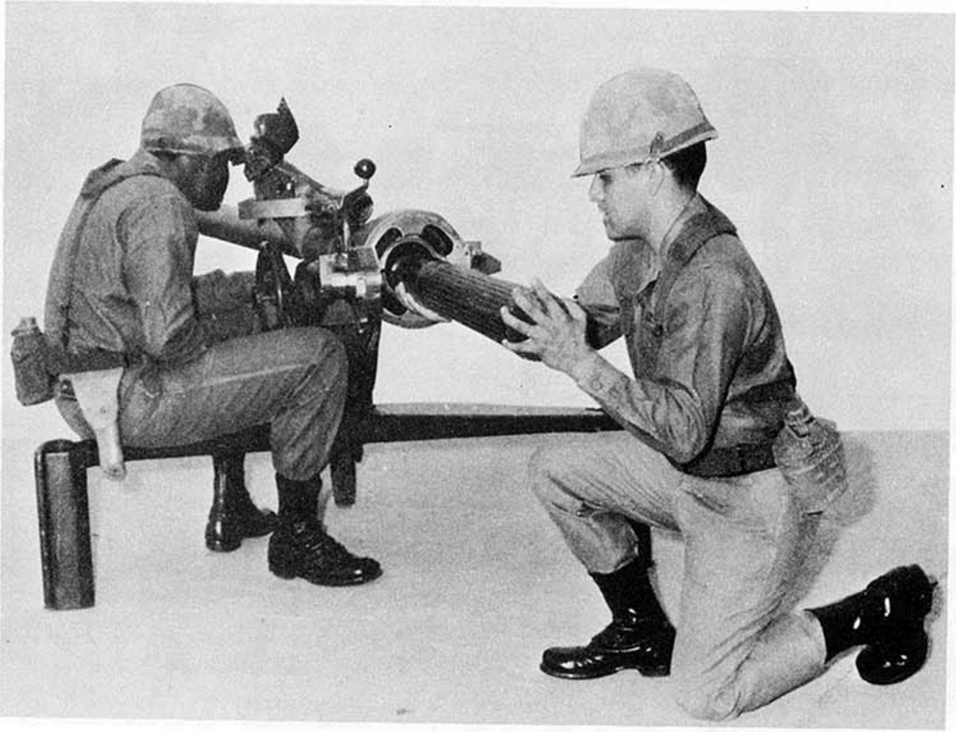


Figure 6–3. Loading the 106-mm recoilless rifle.

(2) *Spotting gun.* To unload the spotting gun, the gunner depresses the magazine release lever and withdraws the magazine. He then pulls the bolt to the rear to clear the chamber, taking care to catch any ejected cartridges.

b. Loading.

(1) *Recoilless rifle* (fig 6–3). To load the recoilless rifle, the loader inserts a round into the chamber and completely chambers it by sharply pushing it all the way forward. To close and lock the breech he grasps the operating lever handle with his right hand, depresses it, and rotates the lever completely forward. Upon locking the breech, he makes sure the backblast area is clear; then he calls UP to tell the gunner that the rifle is ready to fire.

(2) *Spotting gun.* To load the spotting gun, the gunner depresses the magazine release lever and inserts a loaded magazine. He then pulls the bolt completely to the rear, taps the bottom of the magazine, and releases the bolt.

Caution: **Prior to loading, the gunner must look through the magazine opening to see that the firing pin retractor has been installed.**

Warning: **A missing firing pin retractor will cause injury to troops and damage to the weapon.**

c. Firing.

(1) *Recoilless rifle.* To fire the recoilless rifle, the gunner pushes the firing knob.

(2) *Spotting gun.* To fire the spotting gun, the gunner pulls the firing knob. The loader keeps clear of ejected spotting gun cartridges.

d. Clearing.

(1) *Recoilless rifle.* The loader opens the breech and checks the chamber to see that the piece is unloaded. He calls, 106 CLEAR.

(2) *Spotting gun.* The gunner depresses the magazine release lever of the spotting gun and withdraws the magazine. He then pulls the bolt completely to the rear and checks the chamber to see that it is unloaded. He calls ALL CLEAR to declare that both the recoilless rifle and spotting gun are clear.

e. Loader's Safety.

(1) *Recoilless rifle.* The loader's safety (fig. 2–11) enables the recoilless rifle to be moved when a round is in the chamber without danger of accidental discharge. The loader, after loading a round, closes the breechblock by rotating the operating lever until it stops short of the fully locked position. In this position, the breechblock is closed but not fully locked and the weapon cannot be fired. To prepare the recoilless rifle for firing, the loader rotates the lever to the fully closed position, checks the backblast area, and announces UP.

Warning: **If the firing knob is pushed while the operating lever is in the SAFE position, or at any position between SAFE and READY, it is possible that subsequent closing of the breech (without first moving to the fully open position) will fire the weapon. Troops may be injured by an unexpected firing of the weapon.**

(2) *Spotting gun.* To make the spotting gun safe for traveling, the gunner pulls the safety to the rear. He then depresses the magazine catch lever and inserts a loaded magazine. (He does not chamber a round until ready to go into action.)

Section II. CREW DRILL

6–4. General

a. Crew drill develops teamwork in putting the weapon into action with precision and speed. Precision is achieved by strict adherence to prescribed training procedures. When it has been attained, the next phase, speed, is begun.

b. To achieve teamwork, rotate duties frequently during drill so that each squad member becomes proficient in the duties of every other member. This is particularly important with the more detailed actions of the squad leader, loader, and gunner.

c. Practice for speed is the last phase of instruction in crew drill. During this phase, make sure that precision and teamwork are not sacrificed for speed. Unless otherwise stated, move from one position to another at double time but perform initial training for precision at quick time.

6–5. Organization and Equipment for Crew Drill

Squad member	*Individual weapon*	*Individual load*
Squad leader	Rifle	Binoculars, compass, and maps
Gunner	Pistol	None
Loader	Pistol	None
Driver	Rifle	None

6–6. Forming for Crew Drill

At the command FORM FOR CREW DRILL (fig 6–4), members of the squad, except the squad leader, fall in at attention in a rank centered two steps in front of the truck. The squad leader positions himself two steps in front of the driver, facing the rank. To assign positions for crew drill, the squad leader com-

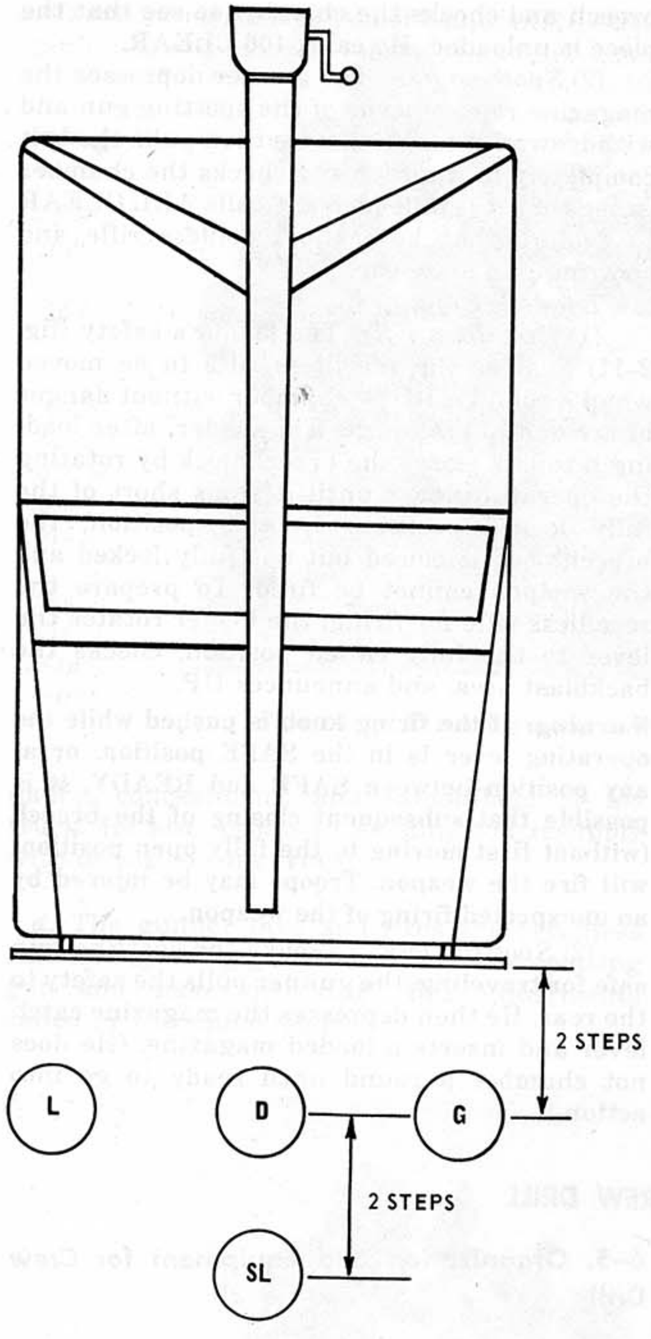


Figure 6–4. Forming for crew drill.

mands CALL OFF. On that command the squad members call off their duties (from right to left).

6–7. Posting the Squad

At the command POST, the squad faces about and all crew members take their "on-truck" positions (fig 6–5).

6–8. Examine Equipment Before Drill

At the command EXAMINE EQUIPMENT BEFORE DRILL (while the squad is "on-truck") crew members examine equipment as follows:

a. Squad Leader.

(1) Checks the barrel traveling lock to see if it functions properly.

(2) Determines that he has the proper maps.

(3) Checks his binoculars to see that the lenses are clean and that there are no broken parts.

(4) Dismounts and moves a short distance from the truck and checks the compass to see that it is in order and functions properly. He remains in this position, facing the weapon until the equipment check is completed and ALL CORRECT is reported.

b. Loader.

(1) Checks the recoilless rifle to determine that the chamber is clear and that the breech mechanism is in firing condition.

(2) Checks to see that all ammunition is properly secured and of the prescribed type.

(3) Checks cleaning material and storage of the rammer staff.

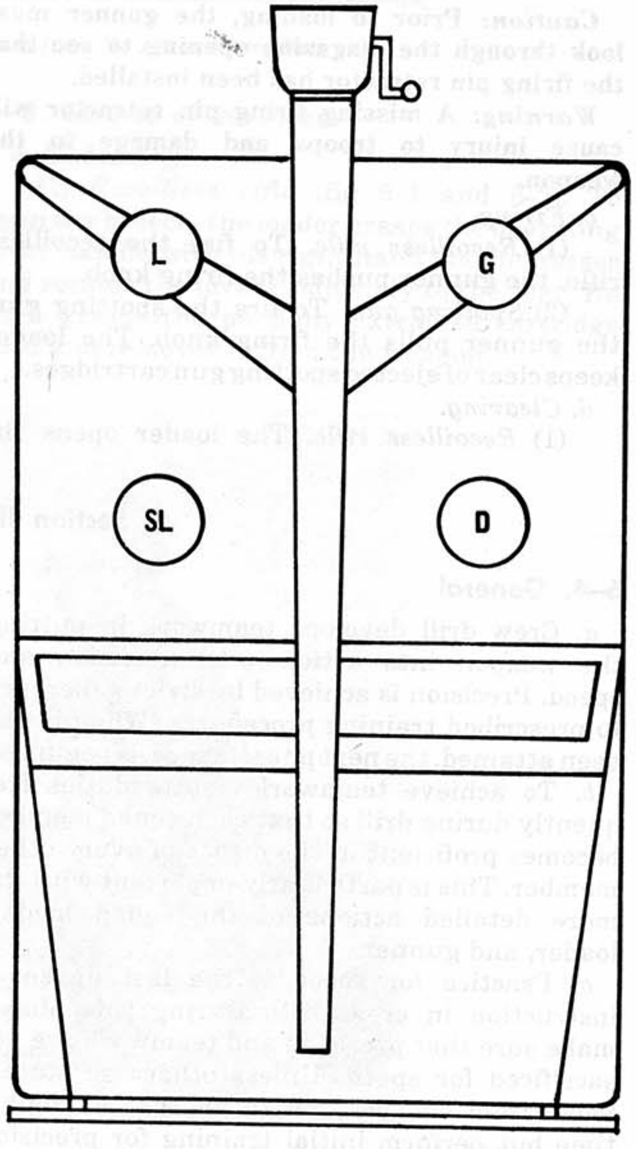


Figure 6–5. On-truck positions.

c. Gunner.

(1) Inspects the spotting gun to see that it is operational as well as clear.

(2) Checks the spotting gun magazines and ammunition to see that they are functional and secured.

(3) Lifts the sight cover and checks the elbow telescope and sight bracket to insure that they are workable, that the cross level vial is not broken, and that the elbow telescope is clean and tight in the bracket.

(4) Checks traversing and elevation mechanisms for proper operation.

6–9. Reports

When all equipment is checked, reports are given:

a. The loader reports RIFLE AND AMMUNITION CORRECT.

b. The gunner reports ALL CORRECT.

6–10. Placing Weapon Into Action

To place the weapon into action, the squad leader commands ACTION.

a. The driver halts and brakes the truck. He dismounts and moves to either flank to occupy a security position.

b. The squad leader disengages the traveling lock and moves to a position from which he can best control the fire of the squad.

c. The loader dismounts and moves to the right of the breech. He opens the breech. Upon hearing the type of ammunition designated, he prepares the round, inserts it into the chamber and seats it firmly. He then closes and locks the breech and inspects the backblast area to see that it is clear. If it is clear, he calls UP to indicate that the rifle is ready to fire.

d. The gunner lifts the sight cover. He loads the spotting gun, lays the rifle on the target, places his right hand on the firing knob, and awaits a call of UP. He fires as directed by the squad leader.

e. After firing, the loader opens the breech with his right hand and ejects the expended cartridge case, throwing it to the side, away from the truck.

6–11. Taking the Weapon Out of Action

The squad leader commands OUT OF ACTION. Upon this command, the loader clears the recoilless rifle, calls 106 CLEAR, closes the breech, and mounts the truck. The gunner clears the spotting gun and calls ALL CLEAR to indicate that both the recoilless rifle and the spotting gun are clear. He lowers the sight cover and manipulates the recoilless rifle tube over the traveling lock. After the gunner calls ALL CLEAR, the squad leader and driver mount the truck. The squad leader secures the traveling lock.

6–12. Preparing To Dismount the 106-mm Recoilless Rifle

Before preparing to dismount the recoilless rifle (fig 6–6), crew members occupy their "on-truck" positions.

a. The squad leader commands PREPARE TO DISMOUNT RIFLE.

b. The driver halts and brakes the truck.

c. The loader dismounts, clears the recoilless rifle, and calls 106 CLEAR. He then faces toward the rear of the truck, disengages the mount's right carrying handle clamp by raising the carrying handle to the horizontal position, and stands ready to help dismount the rifle.

d. The gunner clears the spotting gun and calls ALL CLEAR. He then traverses the weapon to the center of the truck and elevates the tube so that it will clear the bed of the truck when the weapon is lowered to the ground.

e. The squad leader, after hearing ALL CLEAR, disengages the traveling lock, dismounts, and moves to a position to the rear of

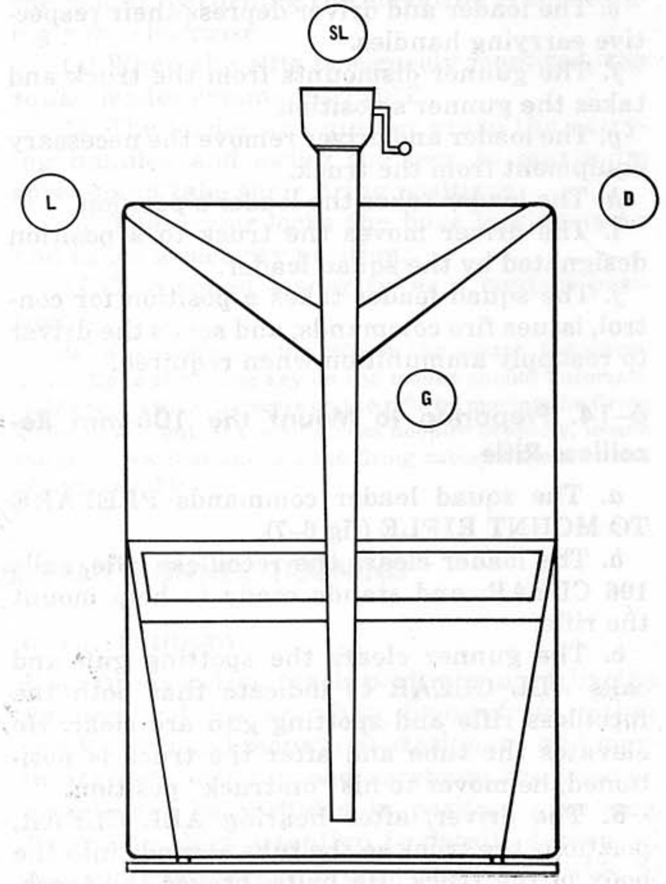


Figure 6–6. Preparing to dismount the 106-mm recoilless rifle.

the weapon where he may direct and assist in dismounting the weapon.

f. The driver, after hearing the gunner call ALL CLEAR, disconnects the front leg clamp, dismounts, moves to a position to the left rear of the truck, and then picks up the carrying handle and helps to dismount the weapon.

6–13. Dismounting the 106-mm Recoilless Rifle

The squad leader commands DISMOUNT RIFLE (fig 6–7).

a. The gunner stands up in the gunner's "on-truck" position, applies pressure downward on the tube, and assists in moving the weapon to the rear.

b. The loader and driver disengage the mount from the truck by cupping their elbows under the carrying handles and lifting upward. After disengaging the mount, they move directly to the rear.

c. When the weapon has been rolled to the rear of the truck the gunner grasps and lifts the tube so that he may assist the loader and driver in lowering the weapon to the ground.

d. Using a two or three man effort, the weapon is rolled or "wheelbarrowed" into the desired position.

e. The loader and driver depress their respective carrying handles.

f. The gunner dismounts from the truck and takes the gunner's position.

g. The loader and driver remove the necessary equipment from the truck.

h. The loader takes the loader's position.

i. The driver moves the truck to a position designated by the squad leader.

j. The squad leader takes a position for control, issues fire commands, and sends the driver to resupply ammunition when required.

6–14. Preparing to Mount the 106-mm Recoilless Rifle

a. The squad leader commands PREPARE TO MOUNT RIFLE (fig 6–7).

b. The loader clears the recoilless rifle, calls 106 CLEAR, and stands ready to help mount the rifle.

c. The gunner clears the spotting gun and calls ALL CLEAR to indicate that both the recoilless rifle and spotting gun are clear. He elevates the tube and after the truck is positioned, he moves to his "on-truck" position.

d. The driver, after hearing ALL CLEAR, positions the truck so the tube extends into the body of the truck. He halts, brakes the truck, dismounts, and moves to the rear of the truck to a position by the left rear leg of the mount.

e. The squad leader positions himself where he can assist and direct the mounting of the rifle.

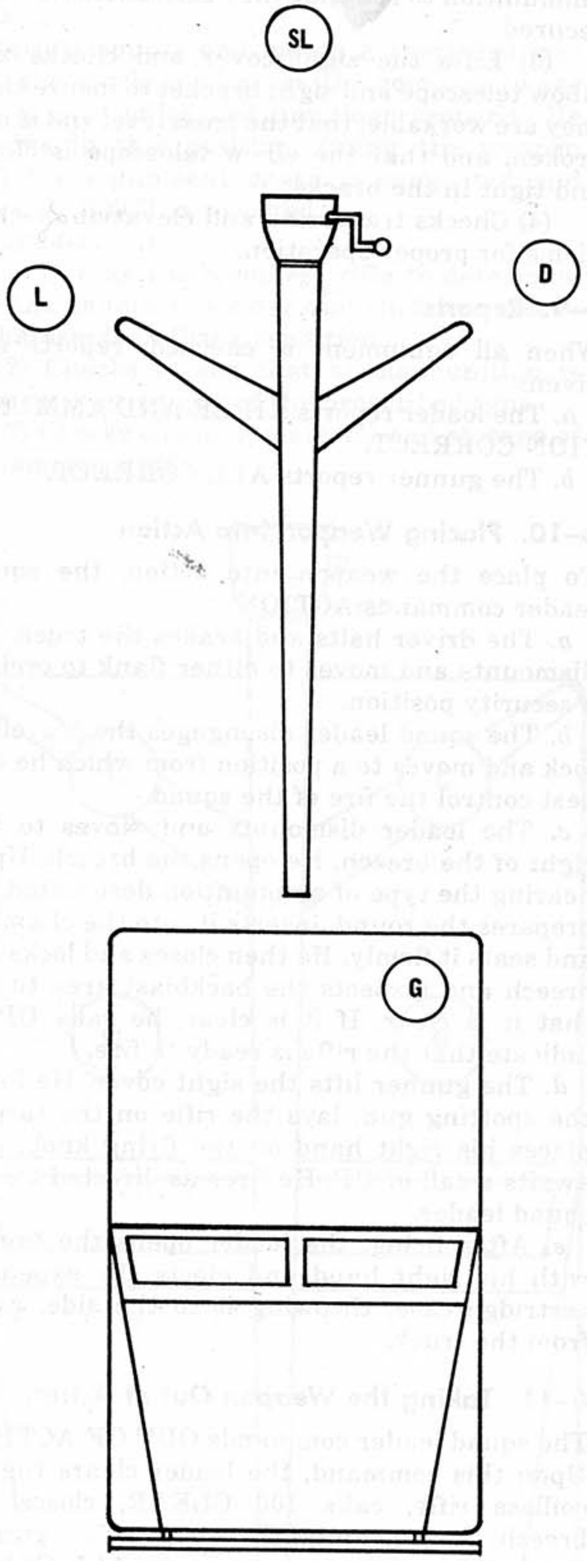


Figure 6–7. Dismounting the 106-mm recoilless rifle. (This is also the prepare to mount position of the crew.)

6–15. Mounting the 106-mm Recoilless Rifle

a. The squad leader commands MOUNT RIFLE.

b. The loader and driver move alongside the rear legs, facing toward the muzzle end of the weapon. They cradle the carrying handles in the crook of their elbows and prepare to lift and roll the weapon onto the truck.

c. The gunner in his "on-truck" position raises up on the tube and assists in mounting the rifle on the truck.

d. The driver and loader roll the weapon onto the truck and engage the two carrying handle clamps by lowering the carrying handles.

e. The driver will then assist the loader in securing ammunition, cleaning material, and the rammer staff.

f. The gunner manipulates the rifle to the traveling position.

g. The loader and driver assume their "on-truck" positions, and the driver engages the front leg clamp on the mount in order to fully secure the weapon to the truck.

h. The squad leader mounts the truck and engages the traveling lock.

Note. When an ammunition vehicle is used in crew drill, and whenever possible in tactical situations, the vehicle approaches the rifle position from the right rear. This allows the crew to carry ammunition and prepare it for firing without entering the backblast area.

6–16. Dismantling the 106-mm Recoilless Rifle for Two-Load Carry

a. The dismounted rifle can be carried over obstacles and difficult terrain by separating it from the mount.

(1) Before dismantling the recoilless rifle, crew members except the squad leader fall in at attention in a rank centered two steps to the rear of the recoilless rifle.

(2) The squad leader positions himself two steps to the rear of the driver and commands PREPARE TO HAND-CARRY RIFLE.

(3) The loader moves into position at the right leg of the mount, clears the rifle, and calls 106 CLEAR.

(4) The gunner moves into position at the left leg of the mount, clears the spotting gun, and calls ALL CLEAR to indicate that both the recoilless rifle and spotting gun are clear.

(5) The driver releases the base locking lever and stands to the right of the muzzle.

(6) The loader and gunner grasp the carrying handles and close the rear legs.

(7) The squad leader moves to the transfer box and releases the elevating cradle locking yoke. He then returns to his original position and calls UP.

(8) The loader and gunner grasp the breech carrying handles; the driver grasps the muzzle. All three then lift the rifle from the mount and move two steps to the right.

(9) The squad leader moves forward, grasps both carrying handles, and "wheelbarrows" the mount to the new position. The other crew members carry the rifle and follow the squad leader.

b. To install the rifle on the mount—

(1) The squad leader positions the mount as desired.

(2) The crew members lift and properly position the rifle on the mount.

(3) The squad leader then locks the rifle to the mount by turning the elevating cradle locking yoke clockwise.

(4) When the rifle is securely mounted, the squad leader commands POST.

(5) The loader and gunner grasp the carrying handles and swing the legs to maximum spread and take their firing positions.

(6) The driver locks the base locking lever and takes a security position.

(7) The squad leader takes a control position.

Note. When replacing the rifle on the mount, the screwdriver tip of the firing key on the mount should automatically engage with its recess on the rifle by moving the firing knobs in and out. If the rifle does not fire properly, loosen the set screw that anchors the firing cable to the rifle and adjust the cable.

Section III. GUNNER AND ASSISTANT GUNNER TRAINING

6–17. Sequence of Training

Steps of preparatory marksmanship are taught in the sequence:

a. Positions.
b. Sighting and aiming.
c. Firing knob manipulation.
d. Breathing.
e. Tracking.
f. Adjustment of fire.
g. Examination.

6–18. Positions

Position exercises teach positions used by the gunner and loader when firing from either truck or ground mounts at stationary and moving targets. Aiming and servicing the weapon system can be included in position exercises. By giving close attention to details during all position exercises, the crew should be able to take their positions automatically. For service of the weapon system, see paragraph 6–3.

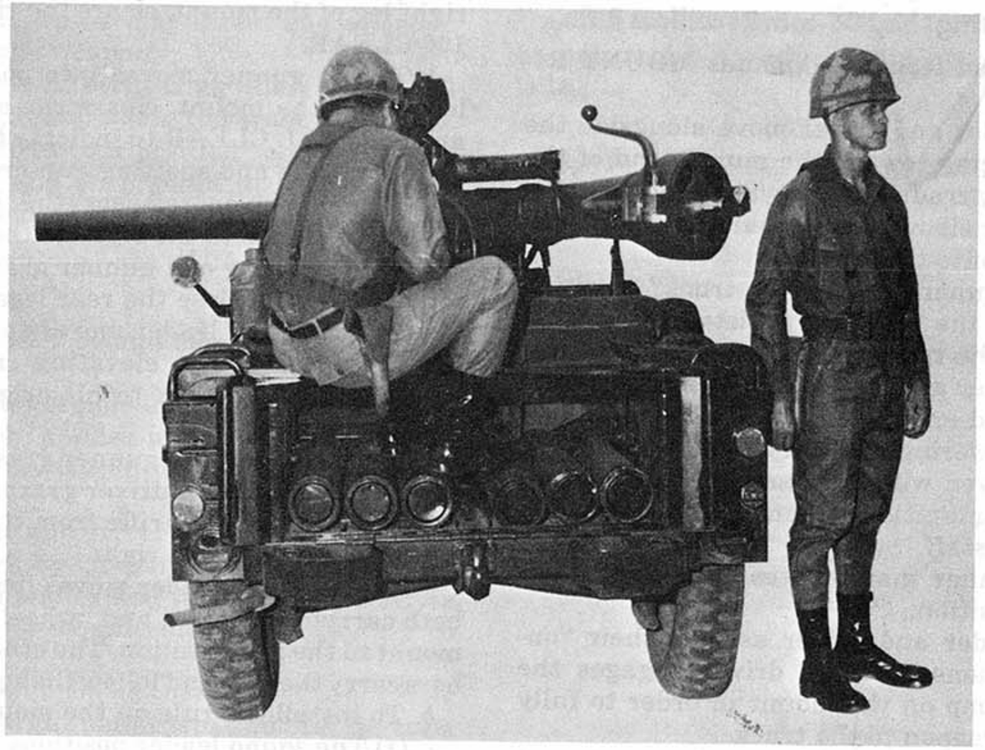


Figure 6–8. Gunner's position, mounted (sitting on tripod leg).

a. Gunner's Position.

(1) *Rifle mounted on truck.* When the rifle is mounted on the truck, the gunner takes a position sitting on the left leg of the mount (fig 6–8) or sitting or squatting on the gunner's seat of the truck (fig 6–9). The gunner bends forward at the waist and looks through the elbow telescope. He operates the traversing mechanism with his left hand and the elevation mechanism with his right hand.

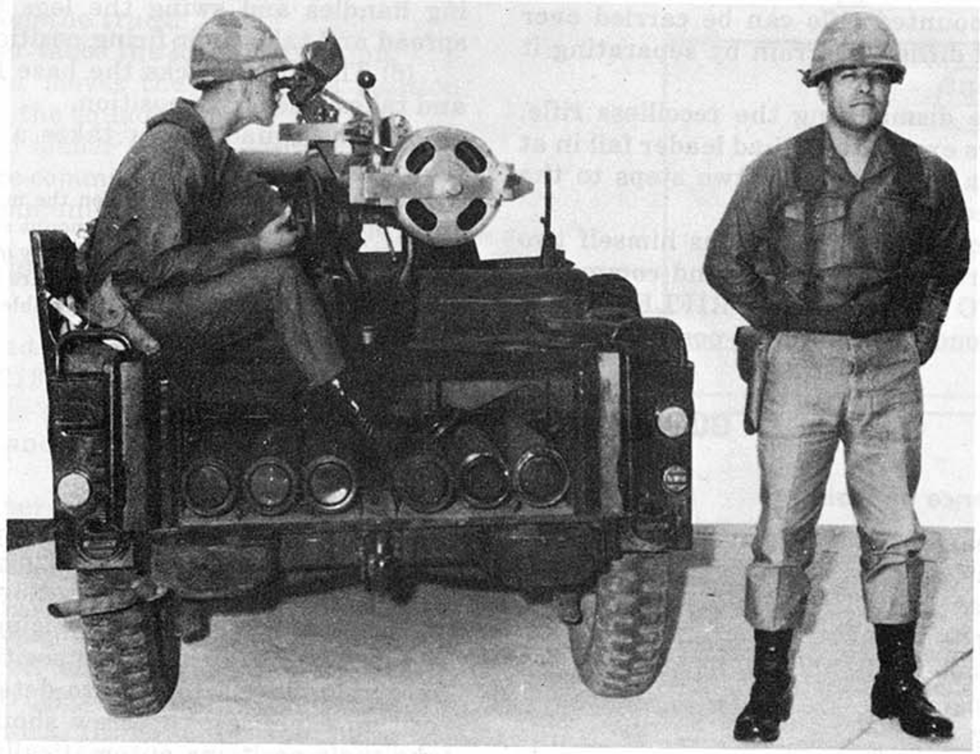


Figure 6–9. Gunner's position, mounted (sitting on gunner's seat of truck).

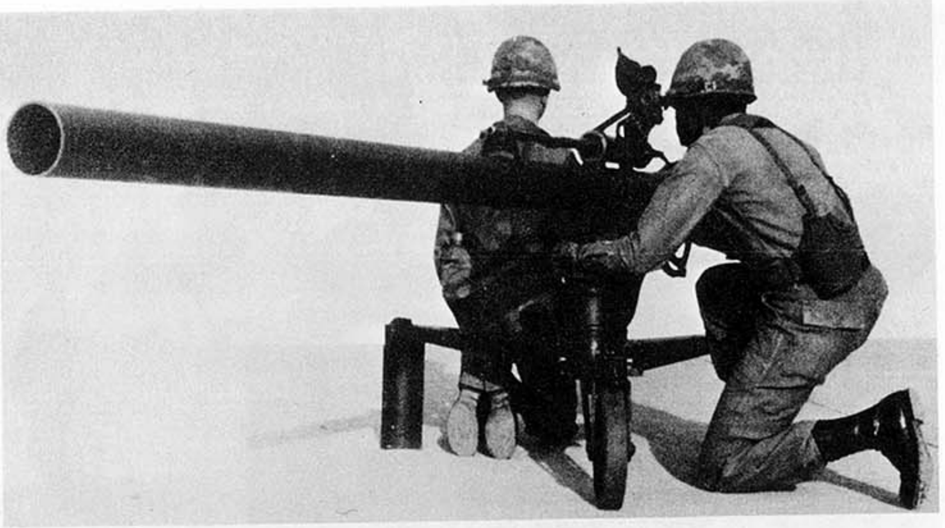


Figure 6–10. Gunner's position (kneeling on left knee).

(2) *Rifle dismounted.* When the rifle is dismounted from the truck, the gunner may kneel on his left knee (fig 6–10), kneel on both knees (fig 6–11), squat (fig 6–12), or sit on one of the tripod legs (fig 6–13). If the weapon is in such a position that the gunner can sit on one of the mount legs and manipulate the rifle, he normally takes that position.

b. Loader's Position.

(1) *Rifle mounted on truck.* When the rifle is mounted on the truck, the loader services the weapon from the right rear of the truck (fig 6–8). He stands on the ground facing the backblast area. He constantly watches the weapon for any shift so that he can keep out of the way of the breech and backblast.

(2) *Rifle dismounted from truck.* When the rifle is dismounted from its truck, the loader takes a position to the right of the breech facing the backblast area. He may kneel on his left knee (fig 6–10) or on both knees (fig 6–11). While servicing the rifle, he is careful to watch for any shift of the weapon so that he remains clear of the breech and backblast.

6–19. Sighting and Aiming

a. Aiming for Range.

(1) During the first exercise, a stationary 1,000-inch, A-type rifle target (FSN 6920-906-0169) or some other appropriate target is used as an aiming point. To aim for range, select the correct segment of the vertical line of the reticle

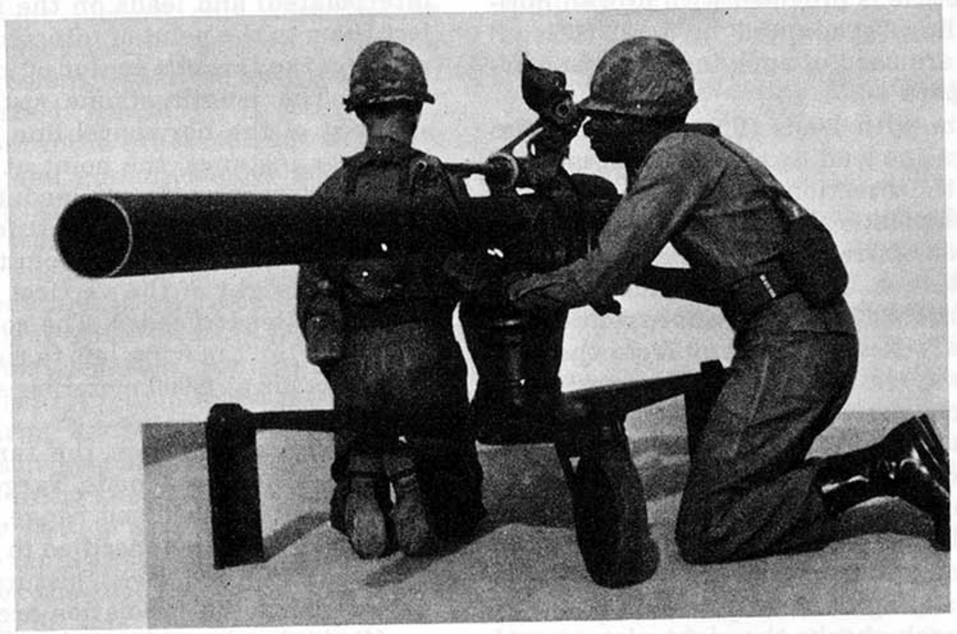


Figure 6–11. Gunner's position (kneeling on both knees).

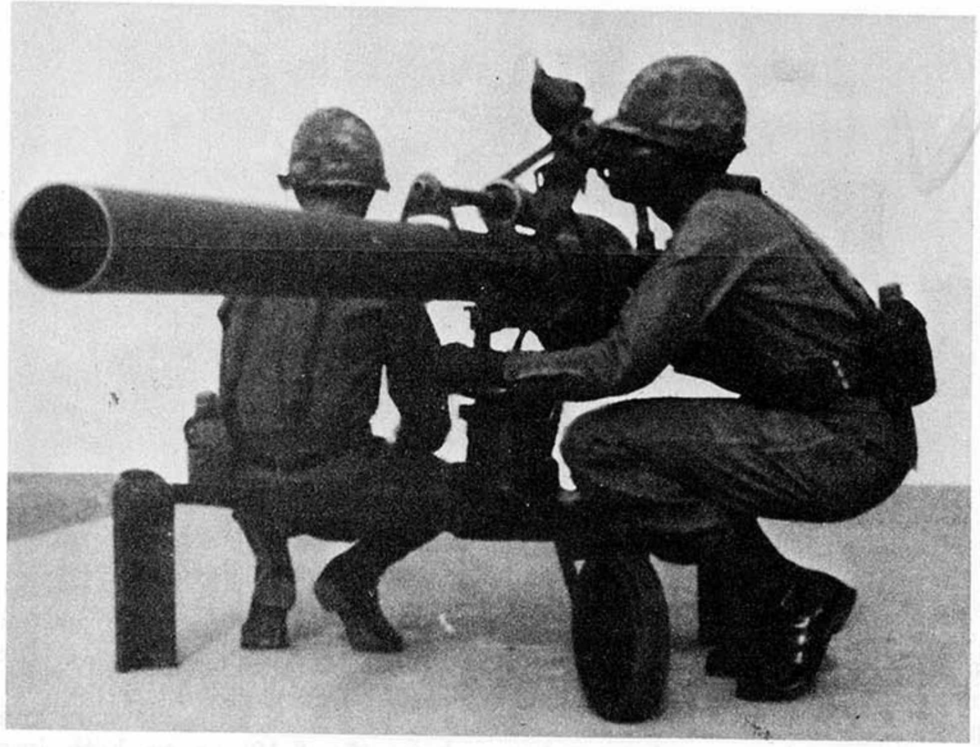


Figure 6-12. Gunner's position (squatting).

and place it on the target's center of mass (fig 6-14).

(2) Find the correct sight picture for each successive 100 meters of range on the reticle. Then progress to sight pictures that require interpolation of range on the reticle; for example, 350 meters, 625 meters. A trained man, acting as coach, should check each sight picture.

b. Aiming With Leads.

(1) The reticle is provided with broken horizontal lead lines graduated in 5-mil (1 lead) units. These are used in applying leads to moving targets (para 1-7*b*).

(2) To aim with leads (fig 6-15), keep the vertical range line leading the center of mass of the target in the direction of movement. To hit a target which has lateral movement with respect to the direction of fire, point the axis of the bore ahead of the target. Use angular leads for firing on moving targets. No leads are used for targets moving directly toward or away from the gun position. Aim at the center of visible mass.

(3) Exercises are conducted that require setting announced leads on a subcaliber target (1,000-inch) or some other practical aiming point. The target remains stationary, but it is assumed to be at any range from 0 to 2,200 meters and moving from right to left at speeds requiring a varying number of leads.

(4) The coach checks the sight picture and the exercise is repeated.

c. Aiming for Range and Leads. Range and leads are combined on the sight reticle by a series of segmented vertical and horizontal lines.

(1) Lead lines extend horizontally right and left of the vertical range line, with 200 meter range intervals between adjacent lead lines. Interpolate the range between 200 meter intervals etched on the sight reticle. Select the appropriate range (this will be imaginary if it is interpolated) and leads on the reticle and project them to the point of intersection. Place this point on the target's center of mass.

(2) The length of one space or one line segment of the horizontal line is equal to one lead. For instance, the point at the end of the first space represents one lead; the point at the end of the second segment four leads (two spaces and two segments). Count off this line, to the left or right of the vertical range line, the number of leads needed. The correct sight picture for a tank moving left to right and requiring two leads at 1,000 meters is shown in figure 6-16.

(3) Lay the rifle on the target at several different ranges and leads. Targets remain stationary, but an assumed range, direction, and number of leads are specified in each case. The coach checks each sight picture. Ranges and leads requiring interpolation are included.

(4) At least one period of training is devoted to the use of the illuminated reticle. This accustoms crews to aiming during periods of limited visibility.

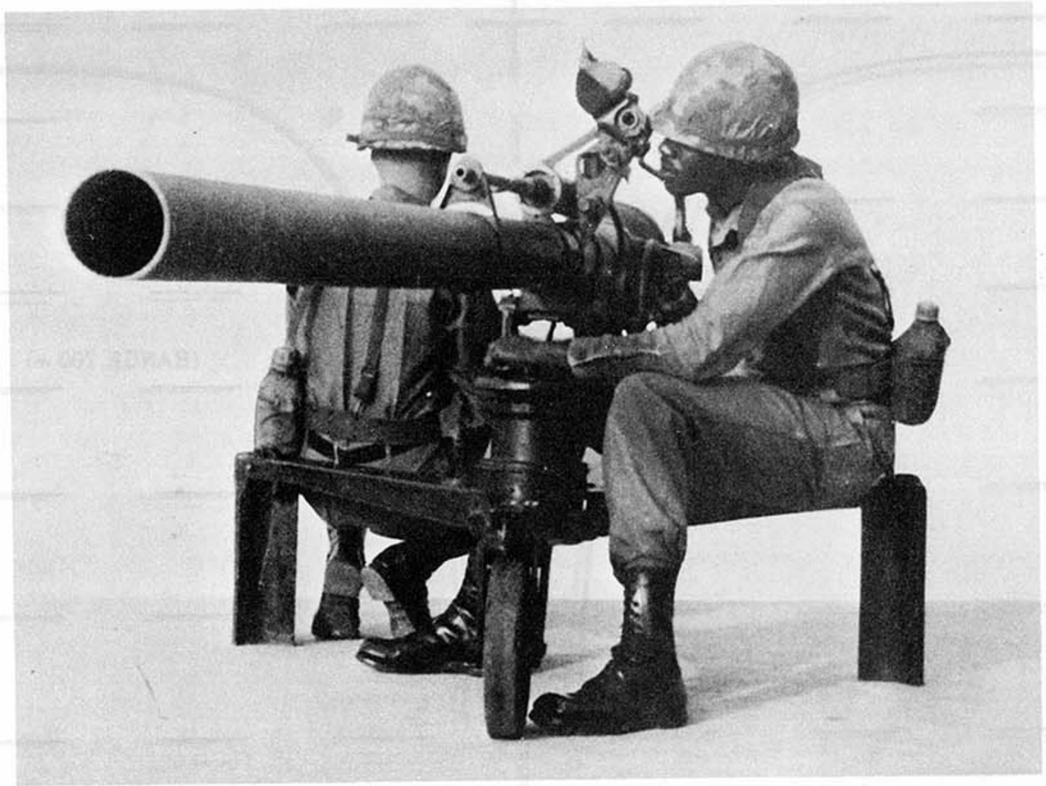


Figure 6-13. Gunner's position (sitting on tripod leg).

6-20. Firing Knob Manipulation

a. An important element of marksmanship training is firing knob manipulation. If the gunner either pulls or pushes the firing knob with a jerky motion, he loses control of the rifle. Although jerking the firing knob may appear to disturb the sight picture only slightly, the slightest movement spoils a good shot. A more extensive movement, made in anticipation of the firing, is called "flinching." It occurs if the gunner anticipates the exact moment when the rifle will fire. The gunner should manipulate the firing knob so that he does not know the exact moment when either the spotting gun or recoilless rifle will fire.

b. The gunner alines the sight on the target by rotating the firing knob with his right hand to make any minor elevation changes necessary before firing his first round. When ready to fire, he pulls the firing knob with a smooth, steady pull to fire each spotting round. He releases tension on the firing knob so that it may return to the neutral position after firing each round. When the gunner is ready to fire the recoilless rifle, he pushes the firing knob with a smooth steady motion. If this procedure is followed, each round fired comes as a surprise to the gunner, and thereby eliminates flinching. Constant practice of firing knob manipulation under the observation and supervision of a good coach greatly improves accuracy.

c. Important points about firing knob manipulation are—

(1) Apply smooth, steady pressure when pulling or pushing the firing knob.

(2) Do not wait too long to fire.

(3) Concentrate on the sight picture rather than the right hand.

(4) Every shot must come as a surprise to the gunner.

(5) Avoid twisting the firing knob when pulling or pushing.

6-21. Breathing

To prevent breathing from interfering with his sight picture, the gunner first takes a breath of air, lets out a portion of it, and then holds the remainder. If the gunner does not fire within a reasonable length of time (8 or 9 seconds), he should not attempt to fire. He relaxes and takes several breaths and again attempts to fire. To check the gunner for proper breathing, watch his back. If it rises and falls as he aims, he is not breathing properly.

6-22. Tracking

When proficiency is attained in sighting and aiming, positions, and firing knob manipulation, training in tracking a moving target be-

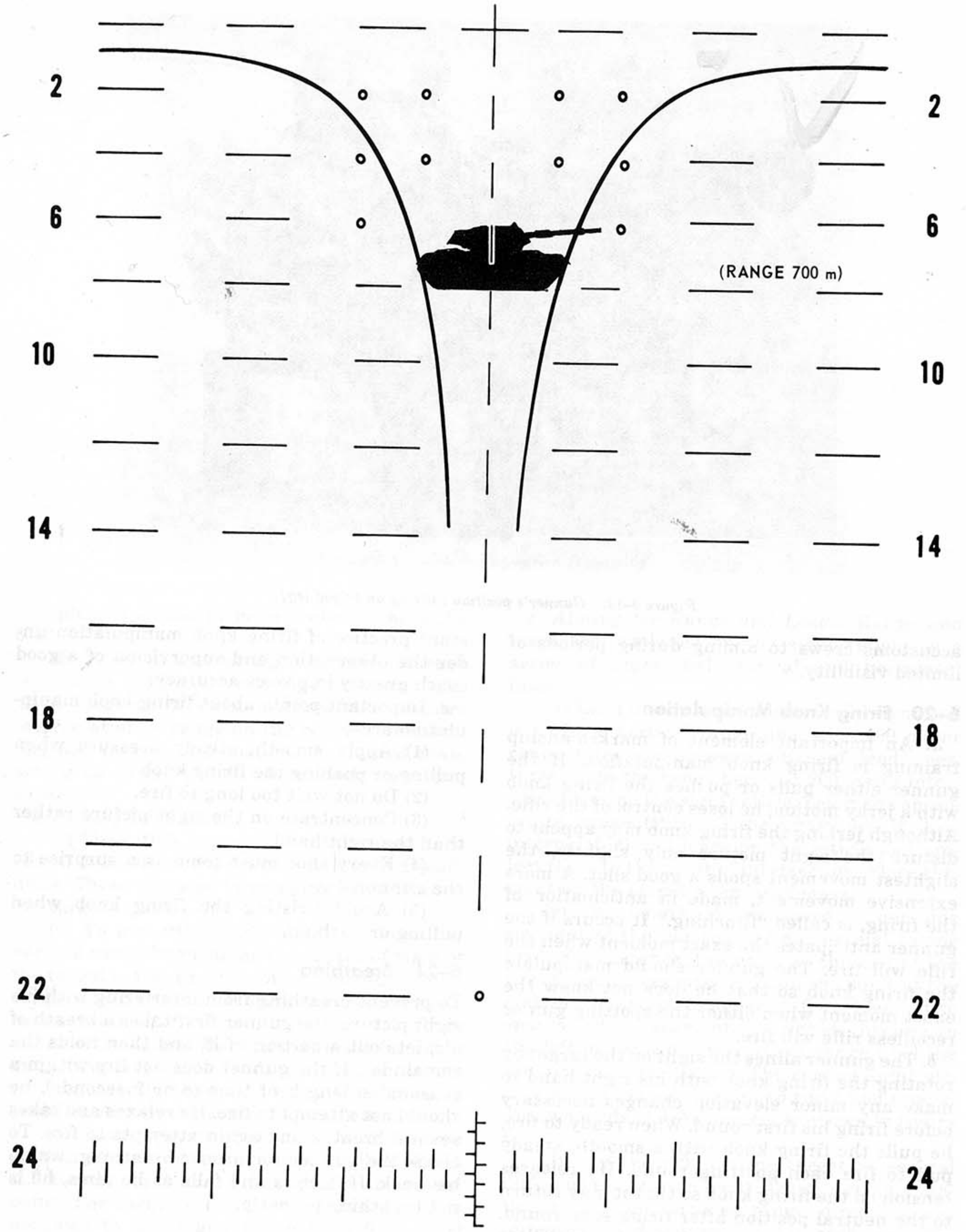


Figure 6–14. Correct sight picture, stationary targets, range 700 meters.

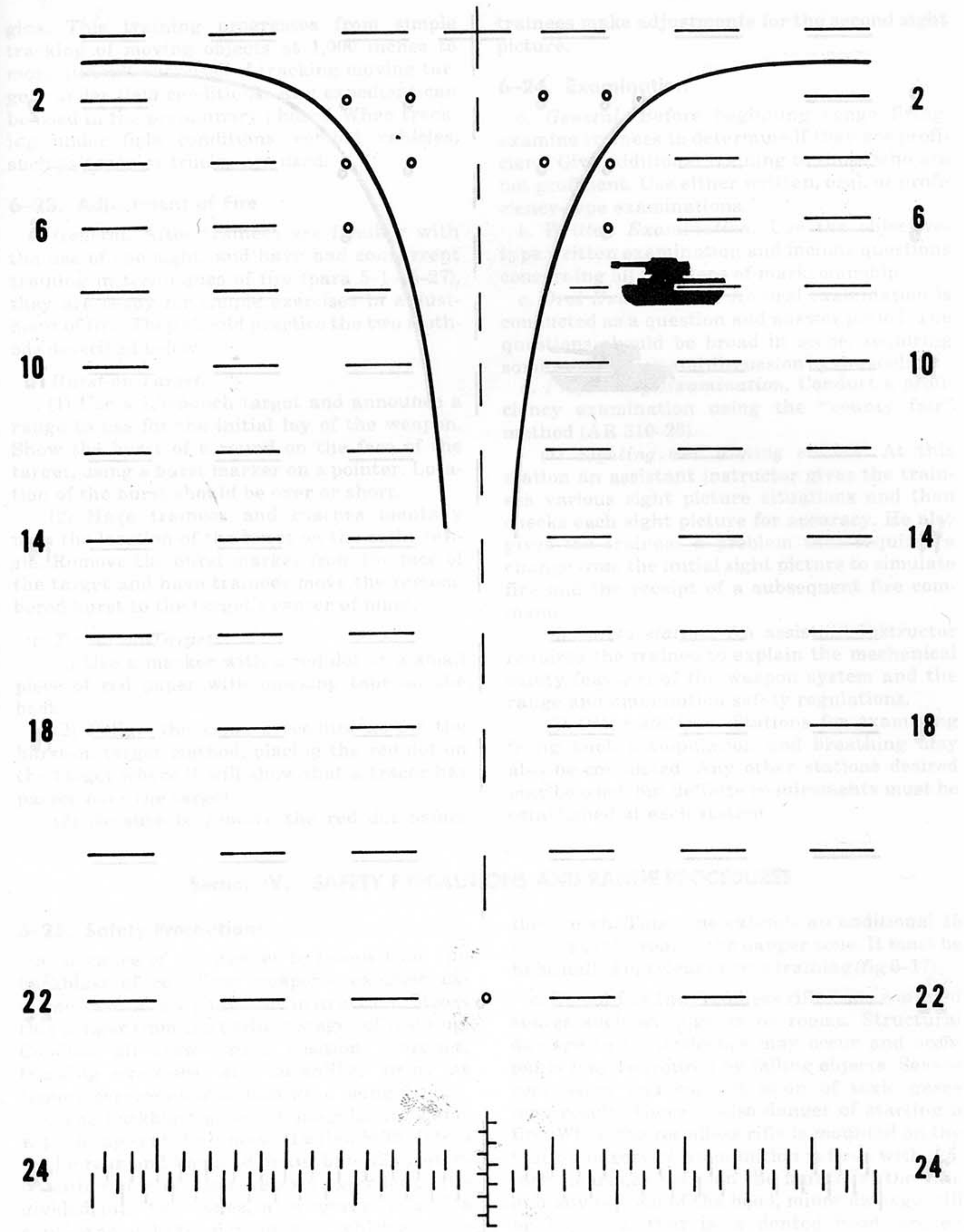


Figure 6–15. Correct sight picture, tank moving right to left: 3 leads, 800 meters.

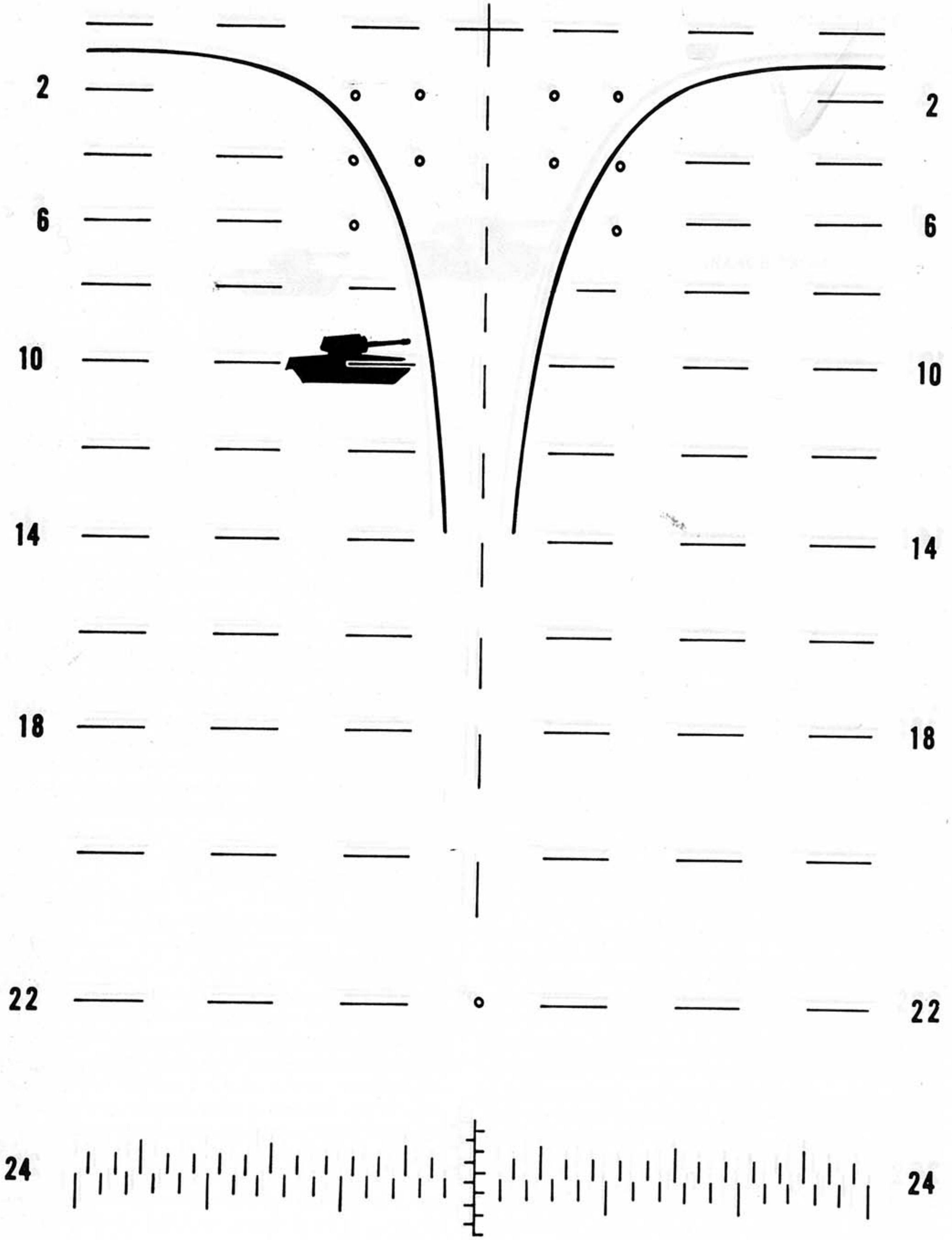


Figure 6–16. Correct sight picture, tank moving left to right: 2 leads, 1000 meters.

gins. This training progresses from simple tracking of moving objects at 1,000 inches to more difficult exercises of tracking moving targets under field conditions. Any expedient can be used in the preliminary phases. When tracking under field conditions, combat vehicles, such as tanks or trucks, are used.

6–23. Adjustment of Fire

a. General. After trainees are familiar with the use of the sight, and have had concurrent training in techniques of fire (para 5–1—5–27), they are ready for simple exercises in adjustment of fire. They should practice the two methods described below.

b. Burst-on-Target.

(1) Use a 1,000-inch target and announce a range to use for the initial lay of the weapon. Show the burst of a round on the face of the target, using a burst marker on a pointer. Location of the burst should be over or short.

(2) Have trainees and coaches mentally note the location of the burst on the sight reticle. Remove the burst marker from the face of the target and have trainees move the remembered burst to the target's center of mass.

c. Tracer-on-Target.

(1) Use a marker with a red dot or a small piece of red paper with masking tape on the back.

(2) Follow the same procedure as for the burst-on-target method, placing the red dot on the target where it will show that a tracer has passed over the target.

(3) Be sure to remove the red dot before trainees make adjustments for the second sight picture.

6–24. Examination

a. General. Before beginning range firing, examine trainees to determine if they are proficient. Give additional training to those who are not proficient. Use either written, oral, or proficiency-type examinations.

b. Written Examination. Use the objective-type written examination and include questions concerning all the steps of marksmanship.

c. Oral Examination. An oral examination is conducted as a question and answer period. The questions should be broad in scope, requiring some explanation and discussion by the soldier.

d. Proficiency Examination. Conduct a proficiency examination using the "county fair" method (AR 310–25).

(1) *Sighting and aiming station.* At this station an assistant instructor gives the trainees various sight picture situations and then checks each sight picture for accuracy. He also gives the trainees a problem that requires a change from the initial sight picture to simulate fire and the receipt of a subsequent fire command.

(2) *Safety station.* An assistant instructor requires the trainee to explain the mechanical safety features of the weapon system and the range and ammunition safety regulations.

(3) *Other stations.* Stations for examining firing knob manipulation and breathing may also be conducted. Any other stations desired may be used, but definite requirements must be established at each station.

Section IV. SAFETY PRECAUTIONS AND RANGE PROCEDURES

6–25. Safety Precautions

a. Because of the danger to troops from the backblast of recoilless weapons, exercise extreme care in all phases of instruction. Stress this danger from the earliest stages of training. Conduct all crew drills, position exercises, tracking exercises, and subcaliber firing as though service ammunition were being fired.

b. The backblast area is triangular in shape, with the apex at the breech. It extends 39 meters to the rear and has a 46-meter base (23 meters on either side of the bore axis extended). It is divided into two zones, a danger zone and a caution zone. In the danger zone, which extends 24 meters to the rear of the breech, serious casualties or fatalities are likely to occur, due to blast and flying debris. In the caution zone a man is relatively safe, provided he does not face the breech. This zone extends an additional 15 meters to the rear of the danger zone. It must be habitually kept clear during training (fig 6–17).

c. Do not fire the recoilless rifle from confined spaces such as dugouts or rooms. Structural damage to the inclosure may occur and occupants may be injured by falling objects. Severe concussion and concentration of toxic gases may result. There is also danger of starting a fire. When the recoilless rifle is mounted on the truck and service ammunition is fired with a 5-inch clearance between the muzzle of the rifle and any portion of the hood, minor damage will be incurred; that is, a dented hood, broken headlights and parking lights. When service ammunition is fired with less than a 5-inch clearance between the muzzle and any portion of the hood, major damage can be expected. To

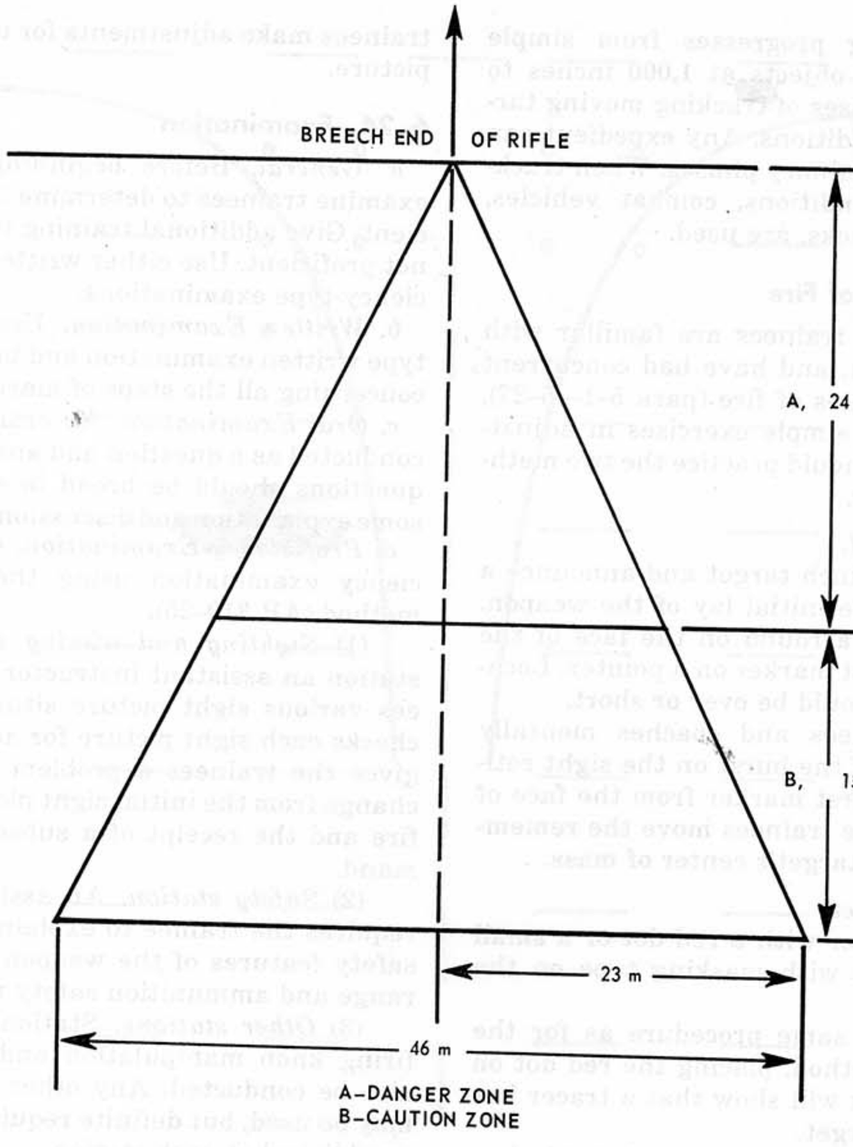


Figure 6–17. Backblast area.

preclude damage to the truck from the backblast, traversing limits from the truck are 115 degrees right and 112 degrees left, with 0 degrees over the center of the hood (fig 6–18). Tactical limitations imposed by these restrictions can be overcome by either dismounting the weapon from the truck or reorienting the truck with respect to the target area.

d. Most conventional-type weapon emplacements are unsuitable for this weapon. Any emplacement where there is an obstruction too near the breech is unsuitable, as the obstruction may deflect the backblast toward the crew. The most suitable emplacements are those which leave the rear of the rifle exposed, or semiexposed, with no obstruction behind the breech; provide cover for the crew on either side of the rifle; and provide cover for the truck when the weapon is truck mounted.

e. If the recoilless rifle has been subjected to continuous firing for a considerable length of time, the tube and chamber become overheated. The heat of the rifle could possibly cause the propellant, fuze, or projectile filler to ignite or explode. An ignition or explosion under such circumstances is called a "cookoff." Cookoffs normally occur between 10 seconds and 5 minutes after a round has been loaded into a hot chamber. If a misfire occurs while the tube is hot, pour water on it until it is cool, then remove the round. If water is not available, all men must stand clear of the muzzle and backblast area until the rifle is cool, and then remove the round.

f. Firing rates for the 106-mm recoilless rifle are—

(1) Maximum sustained rate: One round per minute indefinitely.

(2) Maximum rapid rate: A firing rate not to exceed one round per 6 seconds, with not

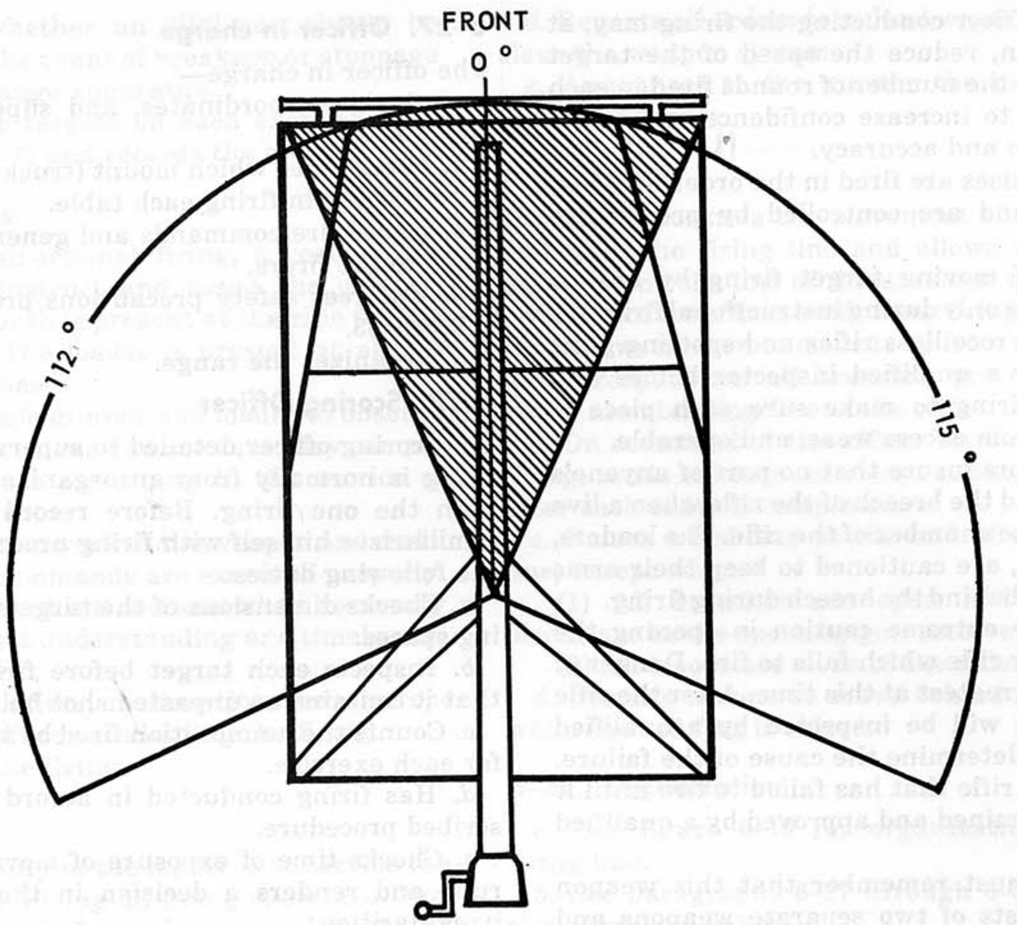


Figure 6–18. Traversing limits for the 106-mm recoilless rifle when fired from the carrier, ¼-ton truck, M151A1C.

(To preclude any damage to the truck, do not fire the rifle over the shaded area shown in this illustration.)

more than five rounds being fired at this rate. A 15-minute cooling period must elapse between two successive rapid rates.

(3) The maximum rapid rate may follow a sustained rate immediately. A 15-minute cooling period must elapse between a period of maximum rapid rate and a sustained-rate period.

g. Procedures for unloading a misfire are—

(1) If a round is loaded into the breech and not fired, it usually can be removed by operating the breech. The extractor partially extracts the round from the chamber. Catch the round as it slides out of the breech.

(2) If the extractor fails to remove the round, assemble the staff and rammer. Place the rifle at about five degrees elevation and open the breech. Insert the rammer into the bore from the muzzle end until it contacts the projectile. Push the staff or tap it gently until the round is dislodged from the tube. Then remove it from the breech.

(3) If the cartridge case becomes separated from the projectile, remove the cartridge casing and thoroughly clean the powder out of the chamber. Place soft material in the bottom of the chamber to act as a cushion when the projectile is pushed back into the chamber. Close the breechblock. Dislodge the projectile as outlined in (2) above. Open the breech and remove the projectile. Take the cartridge case (with the powder in it) and the projectile away from the vicinity of firing. Make a report of the occurrence to the local ordnance officer.

h. Do not disassemble fuzes at any time.

i. When firing service ammunition, crew members should wear earplugs.

j. When firing service ammunition, the weapon becomes dangerous to touch after two or three rounds, due to the heat produced.

k. Comply with safety instructions in AR 385–63.

6–26. Range Procedure

a. During all instructional firing, stress rapid adjustment of fire with a second round target hit as a minimum goal.

b. During the initial phases of instructional firing, the officer conducting the firing may, at his discretion, reduce the speed of the target and increase the number of rounds fired in each run. This is to increase confidence and stress manipulation and accuracy.

c. All exercises are fired in the order listed on the tables and are controlled by proper fire commands.

d. Precede moving target firing by one or more dry runs only during instructional firing.

e. Have all recoilless rifles and spotting guns inspected by a qualified inspector before and after each firing to make sure each piece is clean, free from excess wear, and operable.

f. Instructors insure that no part of anyone's body is behind the breech of the rifle when a live round is in the chamber of the rifle. The loaders, in particular, are cautioned to keep their arms from moving behind the breech during firing.

g. Exercise extreme caution in opening the breech of any rifle which fails to fire. Danger of accidents is greatest at this time. After the rifle is cleared, it will be inspected by a qualified inspector to determine the cause of the failure. Do not use a rifle that has failed to fire until it has been examined and approved by a qualified inspector.

h. Crews must remember that this weapon system consists of two separate weapons and both must be checked and cleared before movement around the weapon system is allowed.

6–27. Officer in charge

The officer in charge—

a. Assigns, coordinates, and supervises the firing line.

b. Determines which mount (truck or ground) is to be used in firing each table.

c. Issues fire commands and general instructions to the firers.

d. Enforces safety precautions prescribed in AR 385–63.

e. Organizes the range.

6–28. Scoring Officer

The scoring officer detailed to supervise record firing is normally from an organization other than the one firing. Before record firing he familiarizes himself with firing procedures and the following duties:

a. Checks dimensions of the targets and scoring spaces.

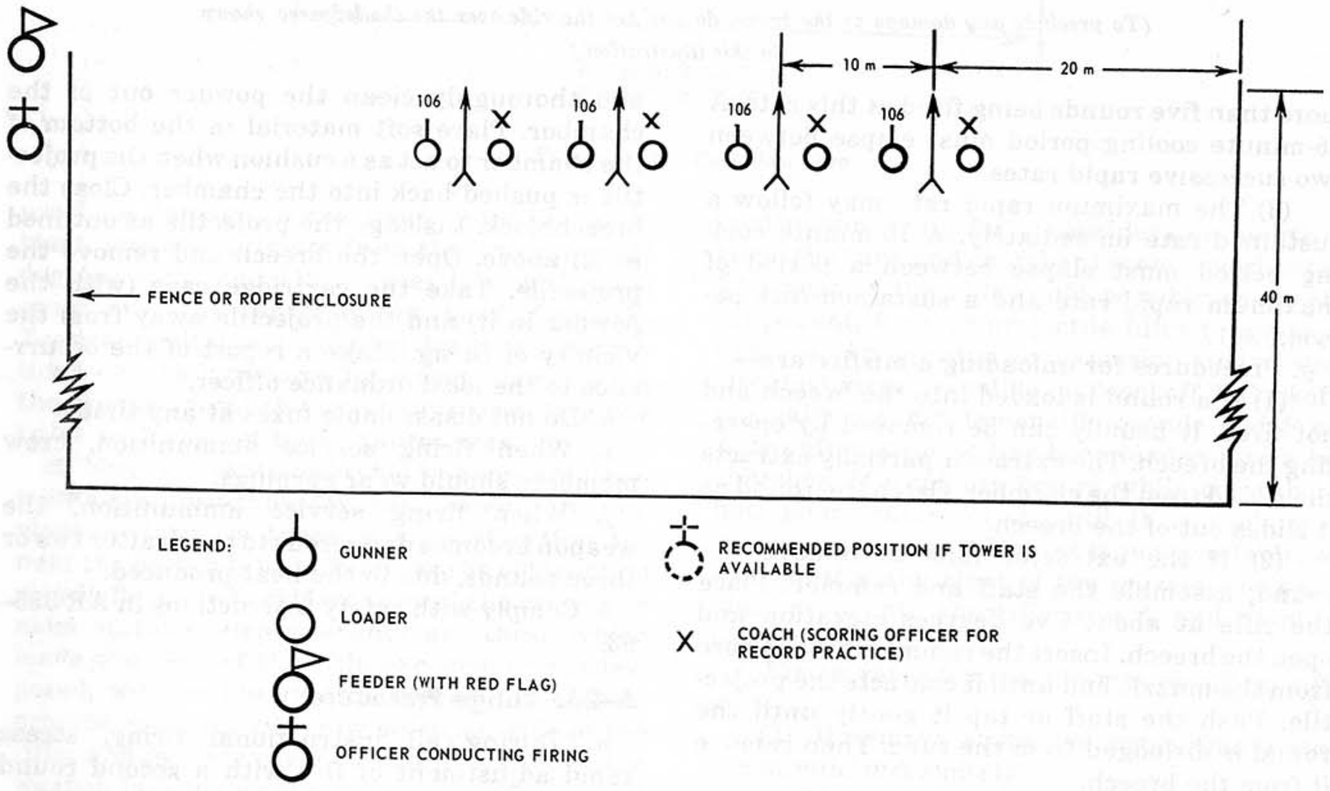
b. Inspects each target before firing to see that it contains no unpasted shot holes.

c. Counts the ammunition fired by the gunner for each exercise.

d. Has firing conducted in accord with prescribed procedure.

e. Checks time of exposure of moving target runs and renders a decision in the event of irregularities.

f. Decides whether misfires and malfunctions of the rifle are the fault of the firer.



106
106
106
106
10 m
20 m
40 m
FENCE OR ROPE ENCLOSURE
LEGEND:
GUNNER
LOADER
FEEDER (WITH RED FLAG)
OFFICER CONDUCTING FIRING
RECOMMENDED POSITION IF TOWER IS AVAILABLE
COACH (SCORING OFFICER FOR RECORD PRACTICE)

Figure 6–19. Range organization.

g. Decides whether an alibi run should be authorized in the event of breakage or stoppage in any of the range apparatus.

h. Scores the targets on each exercise fired (except table 7–3) and records the score.

6–29. Coaches

During all instructional firing, a coach is at each rifle to instruct and assist the gunner. However, no coach is present at the rifle for the record firing. The loader is present at all firings. The coaches—

a. Require each gunner and loader to observe all safety precautions and see that they comply with instructions pertaining to the service of the weapon system.

b. Supervise the work at the weapon and make sure that the commands are executed properly. Repeat orders and instructions when necessary to insure correct understanding and timely execution.

c. Report misfires, malfunctions, or discrepancies to the officer conducting the firing.

d. Critique the firing.

6–30. Loader

The primary duty of the loader is to service the recoilless rifle during all firing exercises. During instructional firing he may also act as assistant coach. During record firing he does not coach or instruct the gunner in any way. He—

a. Loads the recoilless rifle as commanded by the officer conducting the firing.

b. Reports UP, when the weapon is loaded and backblast area is clear.

c. Signals READY to the officer conducting the firing.

d. Repeats all orders to unload, cease fire, and clear the weapon system.

e. Announces to the gunner the number of rounds available.

6–31. Feeder

The feeder controls the movement of troops to and from the firing line and allows no movement behind the line of rifles, except under the direction of the officer conducting firing. He—

a. Allows no men to move to or from the firing line, except when all breeches are open and crews are standing free of the rifles.

b. On command of the officer conducting the firing, sends subsequent relays to the weapons after each order is completed.

c. Raises a red flag at the end of the firing line, except when—

(1) All breeches are open and clearing blocks are in the spotting gun receivers.

(2) All troops are clear of the rifles.

d. Permits no one to move behind the rifles while the red flag is raised.

6–32. Organization

a. See figure 6–19 for organization of the firing line.

b. See paragraphs 6–27 through 6–31 for duties of crew members.

c. No men except those required on the firing line are allowed to enter the fenced or roped-off inclosure at any time.

d. When the red flag is raised, no person enters or leaves the firing line, and no movement between rifles is allowed.

e. Before firing, each recoilless rifle and spotting gun is checked by a qualified instructor to insure that it is in firing condition.

Section V. CREW TRAINING

6–33. General

Field firing develops individual proficiency and teamwork. The unit conducts a series of exercises that simulate battlefield conditions. The situation for each exercise is given by the instructor who is umpire. Unit commanders direct and control their units in the actions required. At the completion of each exercise a critique is held by the umpire.

6–34. Tables

Where possible, the terrain is varied for each table so that the unit is presented with a new situation. Paragraphs 7–1 and 7–2 give guidance for the preparation of such tables.

6–35. Direct Fire

a. Purpose. Direct fire gives the squad leader practice in the control of his squad as it engages various types of targets. Direct fire teaches members of the squad selection of positions, use of cover and concealment, ammunition supply, and technique of fire.

b. Unit. One 106-mm recoilless rifle squad.

c. Situation. Squad is located in an assembly area and is issued ammunition. The squad leader is given pertinent portions of an operations order to include position areas, sectors of fire, and location of friendly troops.

6–36. Method

The squad leader selects his route of approach and his gun positions. He orders the squad into action. When a target is indicated, the squad leader issues fire commands, opens fire, and adjusts his fire. Fire for effect is not a part of these exercises. As soon as the fire of the squad has been adjusted, duties of men in the crews are rotated and a new target is designated. The squad leader is prepared at any time to displace to an alterate or supplementary position or to withdraw to a covered area. Selection of the proper ammunition is the responsibility of the squad leader.

6–37. Types of Targets

a. Two mock tanks or tank chassis; range 800 to 1,100 meters.

b. A camouflaged log and earth pillbox; range 500 to 900 meters.

c. A group of enemy infantry represented by silhouette targets; range 800 to 1,100 meters.

6–38. Ammunition

Exercises are designed for service ammunition; however, where range facilities are limited, subcaliber ammunition may be used. When using subcaliber ammunition the loader simulates service ammunition, specifying it by type.

6–39. Critique

At the completion of each exercise, conduct a critique covering the following points (take care to avoid confusing marksmanship with overall unit performance):

a. Reconnaissance.

b. Actions and orders of unit leaders.

c. Suitability of observation posts.

d. Suitability of alternate positions.

e. Suitability of firing positions.

f. Use of cover and concealment.

g. Technique of fire.

h. Ammunition resupply plans.

i. Actions of squad.

Section VI. FIRING PROCEDURES

6–40. Instructional Firing

a. Before firing, the officer in charge describes the range and gives instructions on firing procedures.

b. Rifles are numbered from right to left.

c. The coach, loader, and gunner take positions at the rifle. The gunner tests the firing, elevating, and traversing mechanisms; the loader gets the necessary ammunition.

d. When all rifles are prepared for firing and the observance of safety regulations is checked, the officer conducting firing gives the fire command.

e. At the completion of an exercise the officer conducting the firing commands CEASE FIRING. The loader rapidly unloads the rifle, makes certain that all men are standing clear of the rifle, and then signals to the officer in charge.

6–41. Stationary Target Firing

An example of the sequence of a fire command follows: FIRE MISSION, FRONT, SUBCALIBER, TARGET SEVEN HUNDRED. When all firing positions have signaled READY, the officer conducting firing commands FIRE. Each gunner fires as directed until his ammunition is expended or until the command CEASE FIRING is given.

6–42. Record Firing

The same procedure as that prescribed for instructional firing is employed for record firing, except as noted below:

a. Each man completes the prescribed instructional firing for the course specified before record firing.

b. Unless the allotted time for firing is limited, record firing does not occur the same day that any portion of instruction occurs.

c. Before firing any exercise for record, the gunner is given a reasonable length of time to check the condition of the weapon system and ammunition.

d. The gunner alines his own weapon system before record firing.

e. The target speed and the allotted time are designated to each gunner before firing.

f. In record firing, when a misfire, stoppage, or malfunction occurs, the gunner or loader holds up his hand and calls STOPPAGE. Thereafter neither the loader nor gunner touches the rifle until the scoring officer examines it.

g. If a misfire, stoppage, or malfunction occurs through no fault of the gunner, the score is disregarded and the gunner is permitted to refire the exercise.

h. Decisions to disregard scores or to authorize refiring of portions of the course rest with the scoring officer.

i. If a misfire or malfunction is clearly the fault of the gunner, he is not permitted to refire that portion of the course.

6–43. Scoring a Soldier for Qualification

a. A departure from the mandatory provisions of this course disqualifies the firer involved.

b. After a man has started an exercise, all shots fired by him count as part of the exercise.

c. A gunner is given credit for only those hits that strike the correct target or scoring space.

d. A hit is scored for each bullet hole found in a target or scoring space, except that no more than the prescribed number of shots are counted. In moving target firing at midranges, scoring is done from the observation of tracer strikes on the target. In field service firing, observation of the strike on the target counts as a hit. The target does not have to be marked.

e. The spotting gun is used only as a range and lead determining device and no spotter-tracer rounds fired from this weapon are scored.

f. For 1000-inch firing, the gunner's name is placed on each target before firing. Except under the supervision of the scoring officer, no person handles any target until it has been scored.

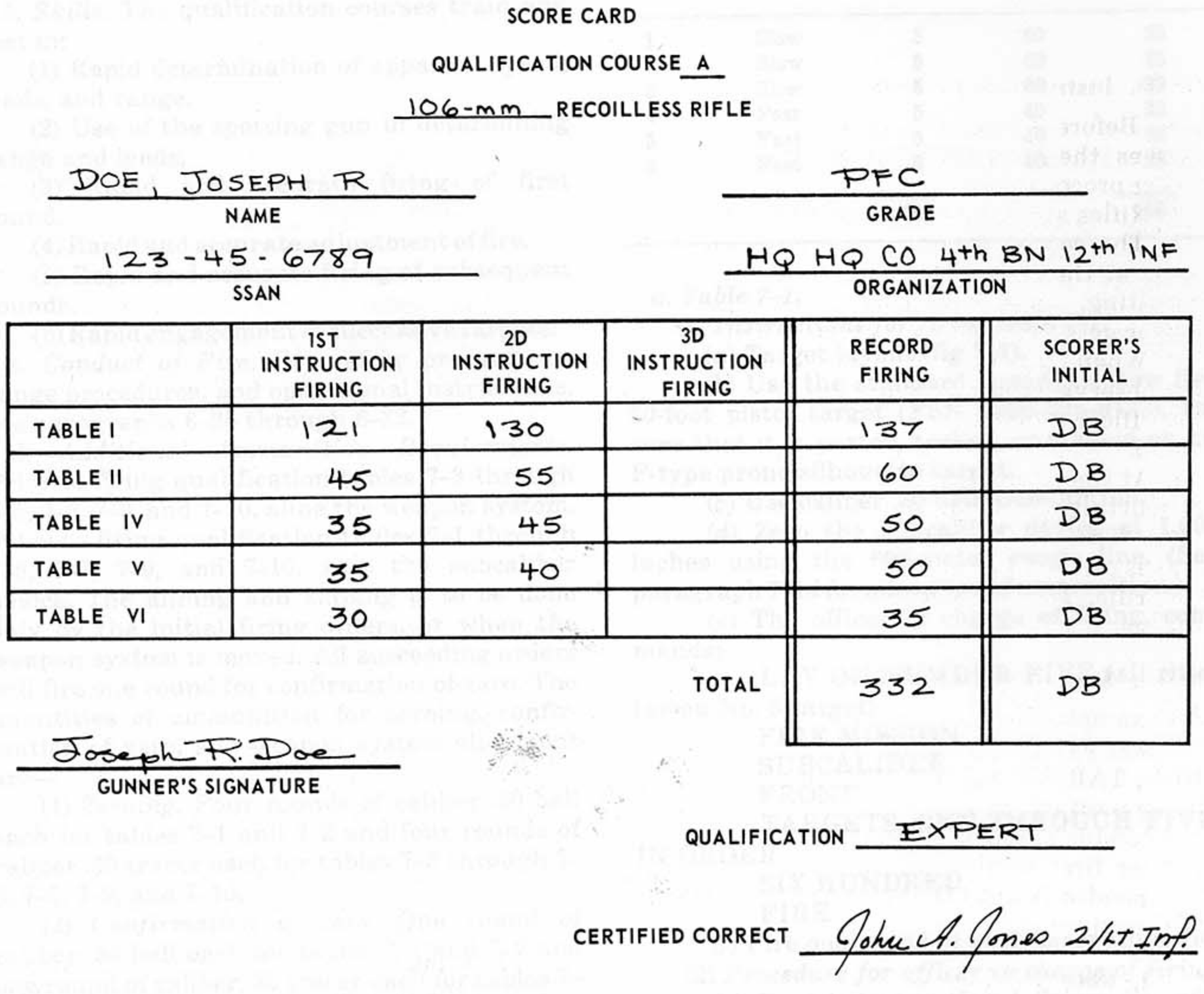
g. A bullet hole that touches the outer line of a scoring space is classified as a hit. A bullet hole cutting or touching the line between two scoring spaces receives credit for the higher value score.

h. For moving target firing, ammunition not fired during the time of exposure of the target is forfeited.

i. Holes made by ricochetting bullets, rocks, or other foreign matter are not counted.

j. Each entry for record practice is made on the scorecard in ink or indelible pencil and is authenticated by the scoring officer. Erasures are not permitted. Only the scoring officer can make alterations and these must be initialed by him.

k. The qualification scorecard (fig 6–20) may be reproduced locally.



SCORE CARD

QUALIFICATION COURSE A

106-mm RECOILLESS RIFLE

NAME: DOE, JOSEPH R

GRADE: PFC

SSAN: 123-45-6789

ORGANIZATION: HQ HQ CO 4th BN 12th INF

	1ST INSTRUCTION FIRING	2D INSTRUCTION FIRING	3D INSTRUCTION FIRING	RECORD FIRING	SCORER'S INITIAL
TABLE I	121	130		137	DB
TABLE II	45	55		60	DB
TABLE IV	35	45		50	DB
TABLE V	35	40		50	DB
TABLE VI	30			35	DB
			TOTAL	332	DB

Joseph R. Doe
GUNNER'S SIGNATURE

QUALIFICATION EXPERT

CERTIFIED CORRECT John A. Jones 2/Lt Inf.

Figure 6–20. Scorecard.

CHAPTER 7

MARKSMANSHIP

Section I. QUALIFICATION FIRING

7–1. Qualification Courses

a. General. Three qualification courses for the 106-mm recoilless rifle consist of firing all or a combination of the tables described in paragraph 7–2 depending on facilities available and the type course desired. Firing may be conducted with the weapon system mounted either on the truck or the ground.

b. Skills. The qualification courses train and test in:

(1) Rapid determination of apparent speed, leads, and range.

(2) Use of the spotting gun in determining range and leads.

(3) Rapid and accurate firing of first round.

(4) Rapid and accurate adjustment of fire.

(5) Rapid and accurate firing of subsequent rounds.

(6) Rapid engagement of successive targets.

c. Conduct of Fire. For safety precautions, range procedures, and operational instructions, see paragraphs 6–25 through 6–32.

d. Additional Ammunition Requirements. Prior to firing qualification tables 7–3 through 7–5, 7–7, 7–9, and 7–10, aline the weapon system. Prior to firing qualification tables 7–1 through 7–5, 7–7, 7–9, and 7–10, zero the subcaliber device. The alining and zeroing is to be done only by the initial firing orders, or when the weapon system is moved. All succeeding orders will fire one round for confirmation of zero. The quantities of ammunition for zeroing, confirmation of zero, and weapon system alinement are—

(1) *Zeroing.* Four rounds of caliber .30 ball each for tables 7–1 and 7–2 and four rounds of caliber .30 tracer each for tables 7–3 through 7–5, 7–7, 7–9, and 7–10.

(2) *Confirmation of zero.* One round of caliber .30 ball each for tables 7–1 and 7–2 and one round of caliber .30 tracer each for tables 7–3 through 7–5, 7–7, 7–9, and 7–10.

(3) *Weapon system alinement.* Six rounds of caliber .50 spotter tracer and six rounds of caliber .30 tracer each for tables 7–3 through 7–5, 7–7, 7–9, and 7–10.

7–2. Qualification Tables

Table 7–1. 1,000-Inch Subcaliber Firing; Stationary Target

Trial	Traverse	Number of rounds	Time (seconds)	Maximum score
1	Slow	5	60	25
2	Slow	5	60	25
3	Slow	5	60	25
4	Fast	5	40	25
5	Fast	5	40	25
6	Fast	5	40	25
		30		150

a. Table 7–1.

(1) *Instructions for firing table 7–1.*

(*a*) Target layout (fig 7–1).

(*b*) Use the standard American slow fire 50-foot pistol target (FSN 6920-695-0133). Insure that it is pasted, tacked, or stapled on an F-type prone silhouette target.

(*c*) Use caliber .30 ball ammunition.

(*d*) Zero the subcaliber device at 1,000 inches using the 600-meter range line. (See paragraph 7–1*d* for allocation of ammunition.)

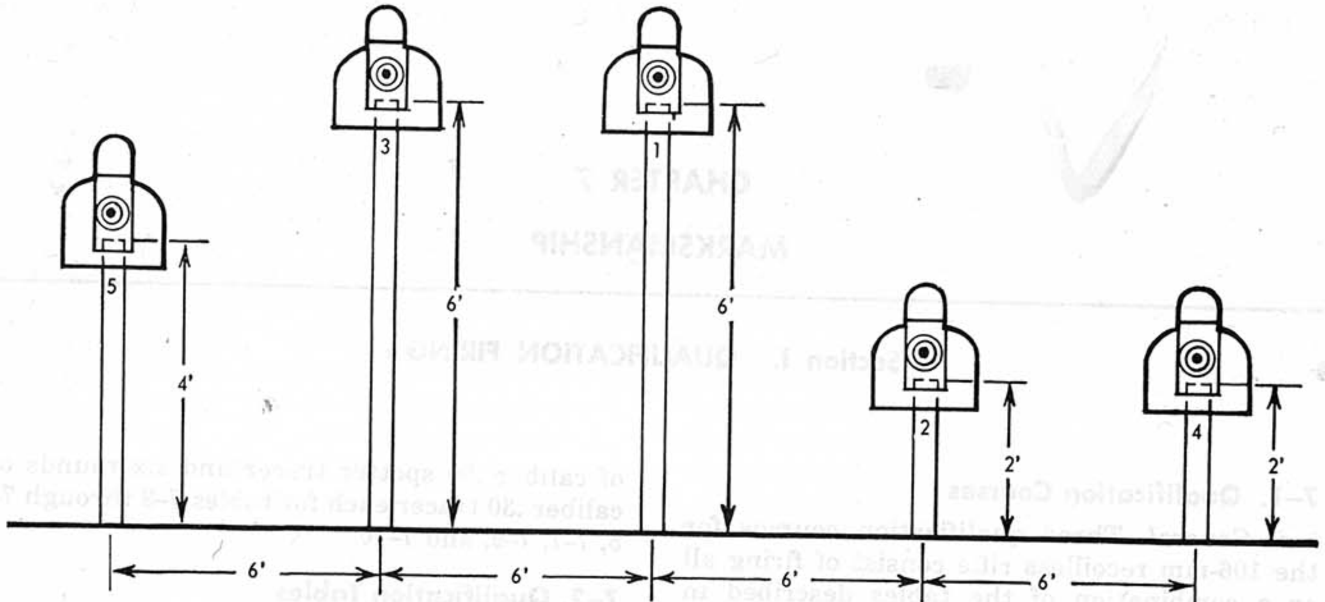
(*e*) The officer in charge of firing, commands:

LAY ON NUMBER FIVE (all rifles lay on No. 5 target)
FIRE MISSION
SUBCALIBER
FRONT
TARGETS, ONE THROUGH FIVE, IN ORDER
SIX HUNDRED
FIRE

(*f*) Fire one round at each target in order.

(2) *Procedure for officer in charge of firing.*

(*a*) During instructional firing, the officer in charge of firing announces TIME at the



TARGET STAKES ARE MADE OF ANY SUITABLE SIZE LUMBER AND ARE NUMBERED AS SHOWN. A PRONE "F" SILHOUETTE TARGET IS TACKED TO THE TOP OF EACH STAKE. STANDARD AMERICAN SLOW FIRE 50 – FOOT PISTOL TARGETS ARE PASTED ONTO THE SILHOUETTE TARGETS.

Figure 7–1. Target layout for 1,000-inch subcaliber firing, stationary target.

end of the prescribed time. He does not command CEASE FIRE until all gunners have completed firing. After completing the two instructional firings for this table, those gunners who have difficulty firing five well-aimed shots during the prescribed time are given additional instruction in "dry" firing the table before record firing.)

(*b*) During the record firing the officer in charge of firing commands CEASE FIRING at the end of the prescribed time. Ammunition fired after this command is scored as a miss.

(*c*) Hits on the Standard American slow fire 50-foot pistol target are scored as follows:

Ring	*Points*
10	5
7, 8, & 9	4
5&6	3
4	2

Table 7–2. 1,000-Inch Subcaliber Firing; Moving Target (Level Track)

Number of rounds per explosive	Speed (inches per second)	Time exposed	Traverse	Leads	Maximum score	Target
3	8	60	Slow	0	15	Top
3	8	60	Slow	1	15	Center
3	8	60	Slow	2	15	Bottom
3	12	40	Fast	0	15	Top
3	12	40	Fast	1	15	Center
3	12	40	Fast	2	15	Bottom
18					90	

b. Table 7–2.

(1) *Instructions for firing table 7–2.* Use targets shown in figures 7–2 and 7–3.

(*a*) Use scoring device shown in figure 7–4.

(*b*) Use caliber .30 ball ammunition.

(*c*) Place the weapon opposite the center of the target track so that the sight is 1,000 inches from the target.

(*d*) Zero the subcaliber device at 1,000 inches, using the 600-meter range line. (See paragraph 7–1*d* for allocation of ammunition.)

(*e*) Gunner fires three rounds at each tank in the following order: top, center, and bottom as target moves in either direction (L to R, or R to L). He uses zero leads when firing at the top tank; 1 lead when firing at the center tank, and 2 leads when firing at the bottom tank. The first gunner fires on the left vertical column of three tanks; the second gunner fires on the right vertical column of three tanks.

(*f*) Score five points for each hit in the proper scoring space; but not more than three hits in each scoring space, using the scoring device.

Note. The scoring device is made of plastic or other transparent material with tick marks and tank silhouette drawn on the plastic with permanent ink. Tick marks are used as guides to help position the device for scoring. The device may be used to score shot groups fired with either 1 lead or 2 leads.

(2) *The officer in charge of firing commands*—

LAY ON AIMING STAKES (all rifles lay on aiming stakes in center of target track).

MOVING TARGET
SUBCALIBER
LEFT (RIGHT) FRONT
TOP, (CENTER, BOTTOM)
SIX HUNDRED
TOP TANK, ZERO LEADS
(CENTER TANK, ONE LEAD)
(BOTTOM TANK, TWO LEADS)
FIRE

(3) This table is fired at least twice for

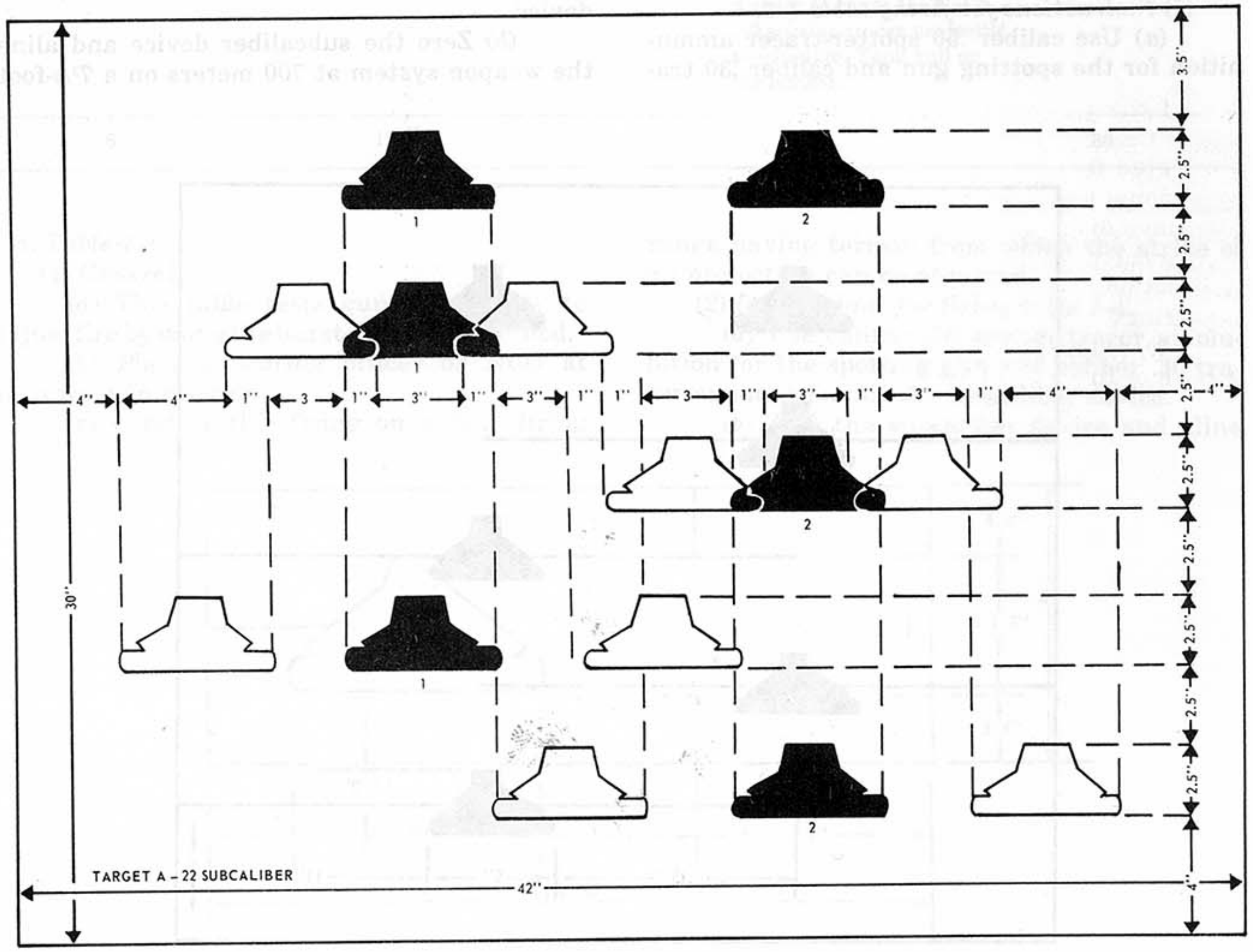


Figure 7–2. Moving target, 1,000-inch subcaliber firing.

instructional firing. On completing this firing, give nonproficient gunners additional training in "dry" firing. They fire the table again before record firing.

Table 7–3. Field Target Firing for Practice Only in Adjustment of Fire by the Burst-on-Target and Tracer-on-Target Methods (Not Scored)

Number of rounds		Range (meters)	Target
Caliber .50 spotter-tracer	Caliber .30 tracer		
Burst-on-Target			7½-foot by 7½-foot target of sufficient density to cause the caliber .50 spotter-tracer projectile to detonate.
3	1	300–500	
3	1	500–800	
Tracer-on-Target			
	3	300–500	
	3	500–800	
6	8		

c. Table 7–3.

(1) *Instructions for firing table 7–3.*

(*a*) Use caliber .50 spotter-tracer ammunition for the spotting gun and caliber .30 tracer ammunition for the caliber .30 subcaliber device.

(*b*) Zero the subcaliber device and aline the weapon system at 700 meters on a 7½-foot by 7½-foot target panel. (See paragraph 7–1*d* for allocation of ammunition.)

(*c*) The first two targets require the gunner to adjust the burst of the spotter-tracer rounds onto the target using the burst-on-target method. Desired proficiency is a hit on the second run. After a hit, one round of caliber .30 tracer is fired.

(*d*) Third and fourth targets are fired with only the subcaliber device, using caliber .30 tracer ammunition and the tracer-on-target method.

(2) *Purpose of table 7–3.* This table is to make sure the gunner understands the burst-on-target and tracer-on-target methods of fire adjustment and to give him practice in using them before he fires table IV.

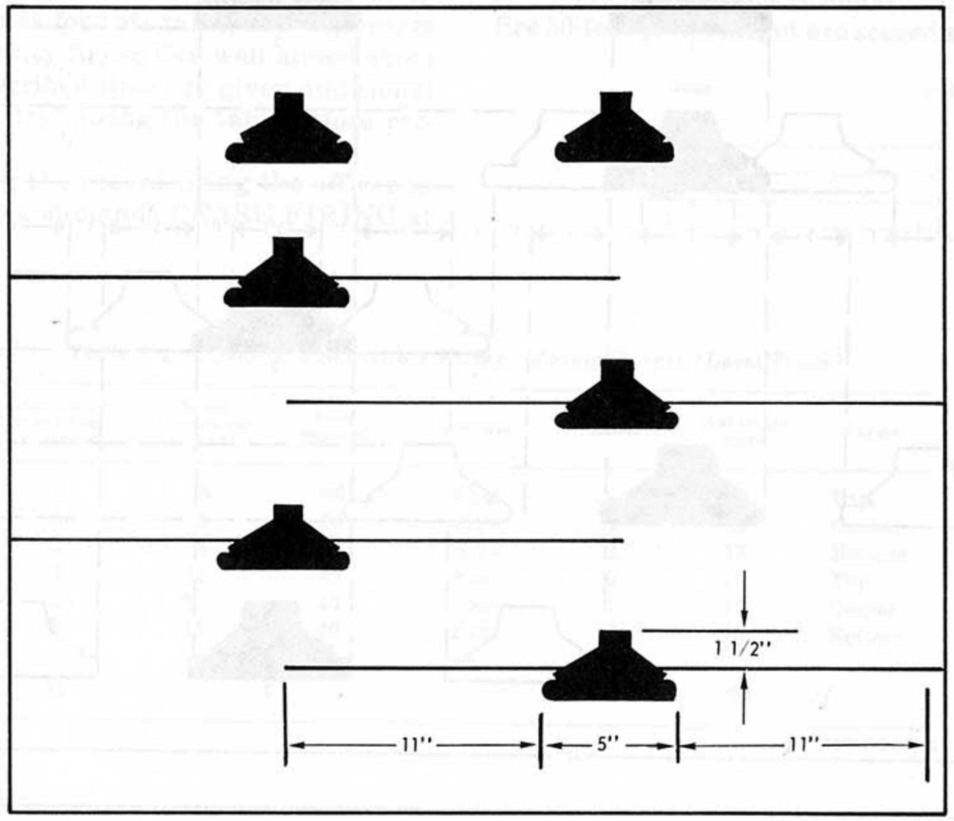


Figure 7–3. Moving target, 1,000-inch subcaliber firing (modified).

Table 7–4. Known-Distance, Subcaliber Firing; Stationary Target

Number of rounds		Range (meters)	Target	Maximum score
Caliber .50 spotter-tracer	Caliber .30 tracer			
2	4	300	Prone F. silhouette M1917, complete	20
2	4	500	Kneeling E, silhouette M1917, complete	20
2	4	700	7½-foot by 7½-foot target of sufficient density to cause the Cal .50 spotter-tracer projectile to detonate. Tank hull or log bunker.	20
6	12			60

d. Table 7–4.

(1) *General.*

(*a*) This table tests gunner's ability to adjust fire by using the burst-on-target method.

(*b*) Place a scoring officer or NCO at each weapon position.

(*c*) Conduct this firing on a field firing range having terrain from which the strike of all projectiles can be observed.

(2) *Instructions for firing table 7–4.*

(*a*) Use caliber .50 spotter-tracer ammunition for the spotting gun and caliber .30 tracer ammunition for the subcaliber device.

(*b*) Zero the subcaliber device and aline

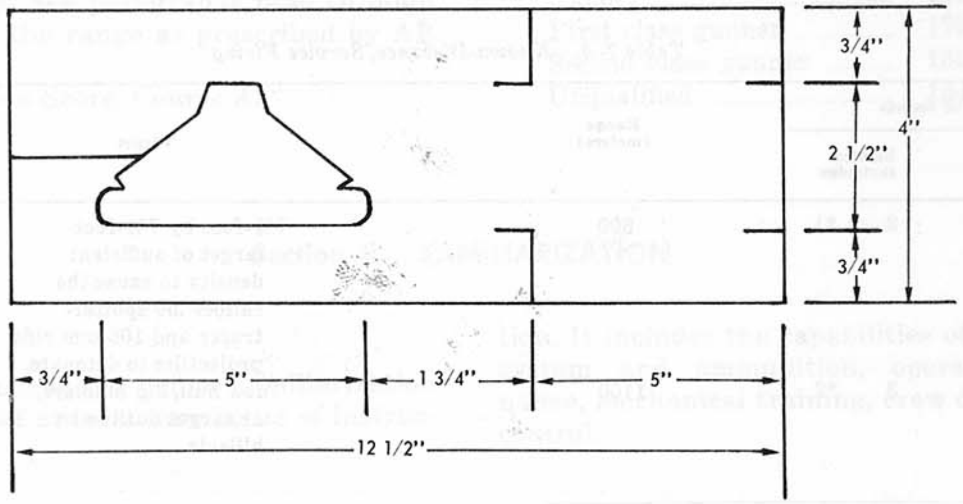


Figure 7–4. Scoring device for 1,000-inch moving target.

the weapon system at 700 meters on a 7½-foot by 7½-foot target panel. After zeroing the subcaliber device, adjust the spotting gun until the strike of both rounds coincide at 700 meters. (See paragraph 7–1*d* for allocation of ammunition.)

(*c*) Two caliber .50 spotter-tracer rounds are allowed for adjustment of fire on each target. If the burst-on-target method is applied properly, the second round should be a hit. If the second round fails to hit the target, subtract five points from the gunner's score on that target.

(*d*) The gunner gets five points for each hit after the adjusting round is fired. A maximum of four hits are scored on each target.

Table 7–5. Known-Distance, Subcaliber Firing; Moving Target

Number of rounds		Speed (miles per hour)	Leads	Maximum score	Remarks
Caliber .50 spotter-tracer	Caliber .30 tracer				
2	3	10	2	15	L to R
2	3	15	3	15	R to L
2	3	10	2	15	L to R
2	3	15	3	15	R to L
8	12			60	

e. Table 7–5.

(1) *Instructions for firing table 7–5.*

(*a*) When possible, use a tank as the target.

(*b*) Use caliber .50 spotter-tracer ammunition for the spotting gun. Use caliber .30 tracer ammunition for the subcaliber device.

(*c*) Zero the subcaliber device and aline the weapon system at 700 meters. (See paragraph 7–1*d* for allocation of ammunition.)

(*d*) Conduct firing on a known-distance, moving target range.

(*e*) Place center of target 450 to 700 meters in front of firing line.

(*f*) A towed target is an authorized substitute for a tank.

(*g*) Length of the target run is about 300 meters.

(2) *Scoring.*

(*a*) Place a scoring officer or NCO at each weapon position.

(*b*) Score five points for each subcaliber hit. Use the spotting gun ammunition for adjustment only, and do not score spotting round hits. Do not score more than three subcaliber hits each time the tank passes across the front.

Table 7–6. Known-Distance, Service Firing

Number of rounds			Range (meters)	Target	Maximum score
Caliber .50 spotter-tracer	Service cartridge				
2	3	*1	800	7½-foot by 7½-foot target of sufficient density to cause the caliber .50 spotter-tracer and 106-mm rifle projectiles to detonate.	20
2	3	*2	1100	Tank hull, log bunkers, or target outline on hillside.	20
4	6	*3			40

* Instructional firing.

f. Table 7–6.

(1) *Instructions for firing table 7–6.*

(*a*) Boresight the recoilless rifle and aline the spotting gun at 1,100 meters. (See paragraph 7–1*d* for allocation of ammunition.)

(*b*) The scoring officer at each weapon marks the score by observing the burst from the firing line.

(*c*) Fire one round at 800 meters and two rounds at 1100 meters for instructional firing; fire three rounds at each range for record.

(2) *Scoring.*

(*a*) The gunner uses the spotting gun for adjustment. He stops firing after getting his first recoilless rifle (106-mm) hit at each range.

(*b*) The gunner gets ten points for his first service ammunition hit at each range and five points for each unexpended round. The spotting gun rounds are not scored.

7–3. Course A

a. General. Instructional firing consists of firing tables 7–1 through 7–6, (three 106-mm rounds only) once. Record firing consists of firing tables 7–1, 7–2, 7–4, 7–5, and 7–6 once under record conditions. (Six 106-mm rounds are allowed for record firing.)

b. Range Facilities. The range facilities for firing Course A include a 1,000-inch subcaliber range, moving target subcaliber range, and service firing range.

c. Equipment per Weapon.

1 combination tool.

1 wrench, adjusting, spotting gun.

1 crescent wrench per rifle.

1 scoring device (table 7–2 for scoring officer.

Boresighting equipment and necessary targets.

d. Conditions. See paragraphs 6–40 through 6–43. Organize the range as prescribed by AR 385–63.

e. Qualification Score, Course A.

Expert	330 to 400.
First class gunner	295 to 329.
Second class gunner	238 to 294.
Unqualified	237 or below.

7–4. Course B

a. General. Instructional firing consists of firing tables 7–1 through 7–5 once. Record firing consists of firing tables 7–1, 7–2, 7–4, and 7–5 once under record conditions.

b. Range Facilities. The range facilities for firing Course B include a 1,000-inch subcaliber range and a midrange subcaliber range. This course is for those posts whose ranges are inadequate for service firing.

c. Equipment. Same as Course A.

d. Conditions. Same as Course A.

e. Qualification scores, Course B.

Expert	306 to 360.
First class gunner	260 to 305.
Second class gunner	216 to 259.
Unqualified	215 or below.

7–5. Course C

a. General. Instructional firing consists of firing tables 7–1 and 7–2 twice. Record firing consists of firing tables 7–1 and 7–2 once under record conditions.

b. Range Facilities. Only a 1,000-inch subcaliber range is needed for firing Course C. The course is for those posts whose range facilities prohibit subcaliber firing at midranges and service firing.

c. Equipment. Same as Course A.

d. Conditions. Same as Course A.

e. Qualification Scores, Course C.

Expert	195 to 240.
First class gunner	173 to 194.
Second class gunner	135 to 172.
Unqualified	134 or below.

Section II. FAMILIARIZATION

7–6. General

Preliminary instruction before familiarization firing consists of at least four hours of instruction. It includes the capabilities of the weapon system and ammunition, operator maintenance, mechanical training, crew drill, and fire control.

7-7. Familiarization Tables (Tables 7-7 and 7-8)

Table 7-7. Known-Distance, Subcaliber Firing; Stationary Target; Familiarization Course

Number of rounds		Range (meters)	Target
Caliber .50 spotter-tracer	Caliber .30 tracer		
2	5	300	Prone F, silhouette, M1917, complete.
2	5	500	Kneeling, E, silhouette, M1917, complete.
2	5	700	7½-foot by 7½-foot target of sufficient density to cause the caliber .50 spotter-tracer projectile to detonate. Tank hull or log bunker.
6	15		

a. Table 7-7.

(1) *Instructions for firing table 7-7.* Use caliber .50 spotter-tracer ammunition for the spotting gun and caliber .30 tracer ammunition for the subcaliber device.

(2) *Zeroing and firing.*

(*a*) Zero the subcaliber device and aline the weapon system at 700 meters. (See paragraph 7-1*d* for allocation of ammunition.)

(*b*) Conduct firing on a field range where the terrain allows observation of the tracer ammunition. Adjust fire by observing the tracer and the strike of the round.

Table 7-8. Known-Distance, Service Firing; Familiarization Course

Number of rounds		Range (meters)	Target
Caliber .50 spotter-tracer	Service cartridge		
2	2	800	7½-foot by 7½-foot target of sufficient density to detonate caliber .50 spotter-tracer and 106-mm projectile. Tank hull, log bunker, or target outline on hillside.

b. Table 7-8.

(1) *Instructions for firing table 7-8.* Boresight the recoilless rifle and aline the spotting gun at 1,100 meters. (See paragraph 7-1*d* for allocation of ammunition.)

(2) *Range organization* (fig 6-19).

Section III. NIGHT FIRE TRAINING

7-8. General

This section is designed for familiarization firing during the hours of darkness. Night fire training consists of preliminary instruction on the techniques of night firing to include firing table 7-9 at night. In addition, table 7-10 will be fired when the crew served weapon night vision sight is available for training. The method of illuminating the range area for firing table 7-9 depends upon the means available. For methods of artificial illumination, see FM 20-60.

7-9. Table 7-9

Table 7-9. Night Fire; Known-Distance, Subcaliber Firing; Stationary Target; Familiarization Course

Number of rounds		Range (meters)	Target
Caliber .50 spotter-tracer	Caliber .30 tracer		
4	2	300	Prone F, silhouette, M1917, complete.
4	2	500	Kneeling E, silhouette, M1917, complete.
4	2	700	7½-foot by 7½-foot target of sufficient density to cause the caliber .50 spotter-tracer projectile to detonate (tank hull or log bunkers).
12	6		

a. Range Facilities. Only a midrange subcaliber range is needed for firing this course.

b. Equipment.

(1) Same as Course A.

(2) Instrument light per weapon.

(3) Means of artificial illumination.

(4) Flashlights for safety troops.

c. Conditions. See paragraphs 6-40 through 6-43.

d. Instructions for Firing Table 7-9. Use caliber .50 spotter-tracer ammunition for the spotting gun and caliber .30 tracer ammunition for the subcaliber device.

e. Zeroing and Firing.

(1) Zero the subcaliber device and aline the weapon during daylight hours at 700 meters. (See paragraph 7-1*d* for allocation of ammunition.)

(2) Conduct firing on a field range that will allow observation of the tracer ammunition. Adjust fire by observing the tracer and the strikes.

7-10. Table 7-10

Table 7-10. Night Fire; Known-Distance, Subcaliber Firing, Stationary Target; Crew Served Weapon Night Vision Sight; Familiarization Course

Number of rounds		Range (meters)	Target
Caliber .50 spotter-tracer	Caliber .30 tracer		
4	2	300	7½-foot by 7½-foot target of sufficient density to cause the caliber .50 spotter-tracer projectile to detonate (tank hull or log bunkers).
4	2	500	
4	2	700	
12	6		

a. General.

(1) This table is to familiarize the gunner with firing the weapon system at night using the crew served weapon night vision sight.

(2) Conduct this firing on a midrange subcaliber range.

b. Equipment.

(1) Same as Course A.

(2) Instrument light per weapon.

(3) Crew served weapon night vision sight and weapons adapter bracket per rifle.

(4) Flashlights for safety troops.

c. Conditions. See paragraphs 6-40 through 6-43.

d. Instructions for Firing Table 7-10. Use caliber .50 spotter-tracer ammunition for the spotting gun and caliber .30 tracer ammunition for the subcaliber device.

e. Zeroing and Firing.

(1) Zero the weapon system during daylight hours at 700 meters. (See paragraph 7-1*d* for allocation of ammunition.)

(2) Boresight the crew served weapon night vision sight to the weapon during daylight hours.

(3) Conduct firing on a field range that will allow observation of the tracer ammunition.

CHAPTER 8

ADVICE TO INSTRUCTORS

8–1. Purpose

This chapter is a guide for instructors in preparing, organizing, and presenting instruction for units equipped with the 106-mm recoilless rifle.

8–2. Methods of Instruction

Basic teaching methods covered in FM 21–6 apply to instruction for the recoilless rifle. The nature of the subjects involved lends itself to demonstration and application as the best methods of instruction.

8–3. Subject Schedules

Use ASubjScd 23–82 or appendix A, this FM as a guide for scheduling and instruction on the recoilless rifle.

8–4. Training Aids

Training aids are useful in weapons instruction to explain subjects (functioning, sighting and aiming, and ammunition) that are difficult to demonstrate using the equipment itself. The following training aids assist in the instruction:

a. Nomenclature Boards (fig 8–1 and 8–2).

b. Charts.

(1) Phases of functioning, recoilless rifle and caliber .50 spotting gun (fig 8–3 and 8–4), and large instruction charts may be devised from figures 3–8, 3–9, and 3–10.

(2) Stoppages and immediate action recoilless rifle and caliber .50 spotting gun (fig 8–5 and 8–6).

(3) Backblast area (fig 6–17).

(4) Range card (fig 5–14).

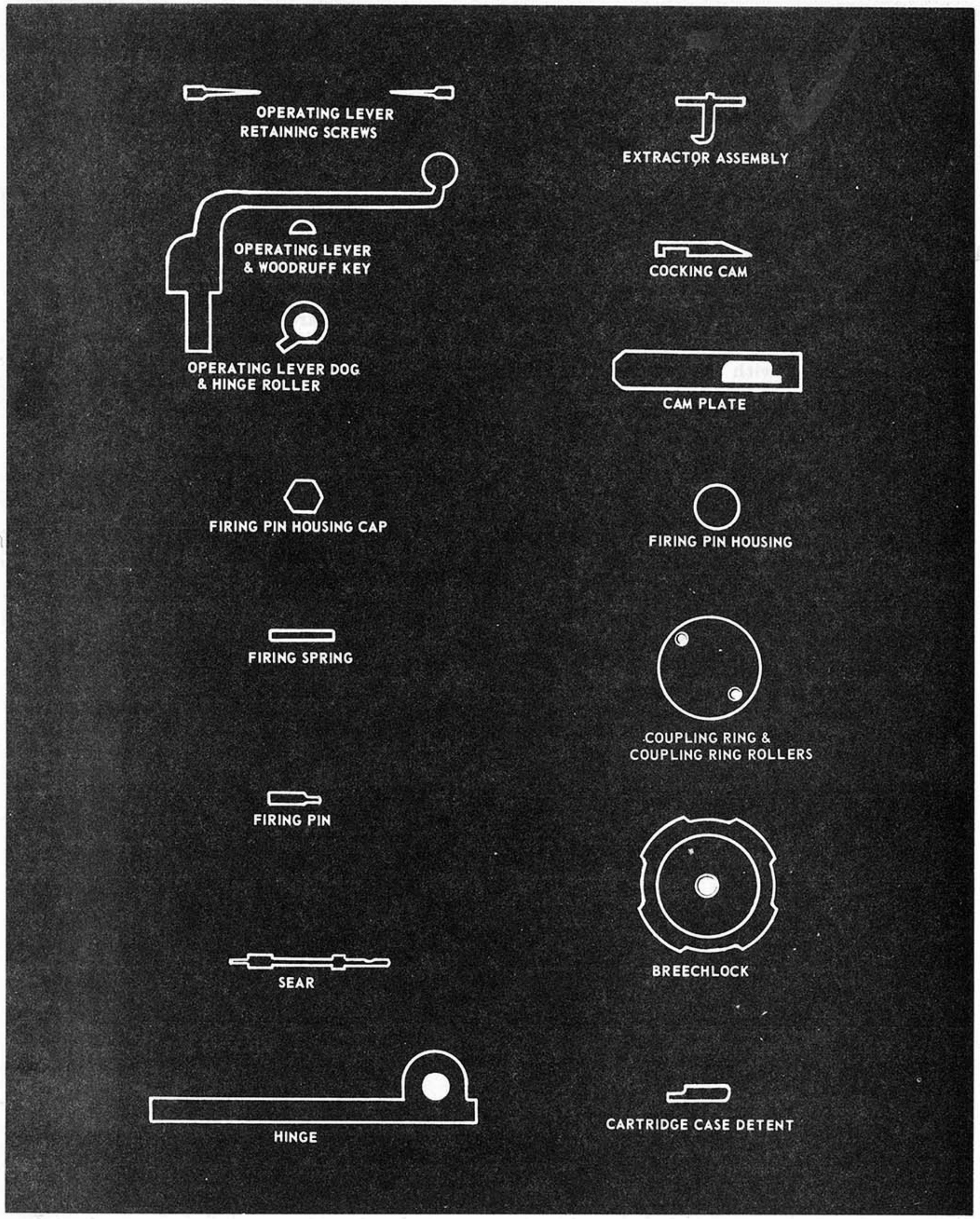


Figure 8–1. Nomenclature board and functioning setup (106-mm recoilless rifle).

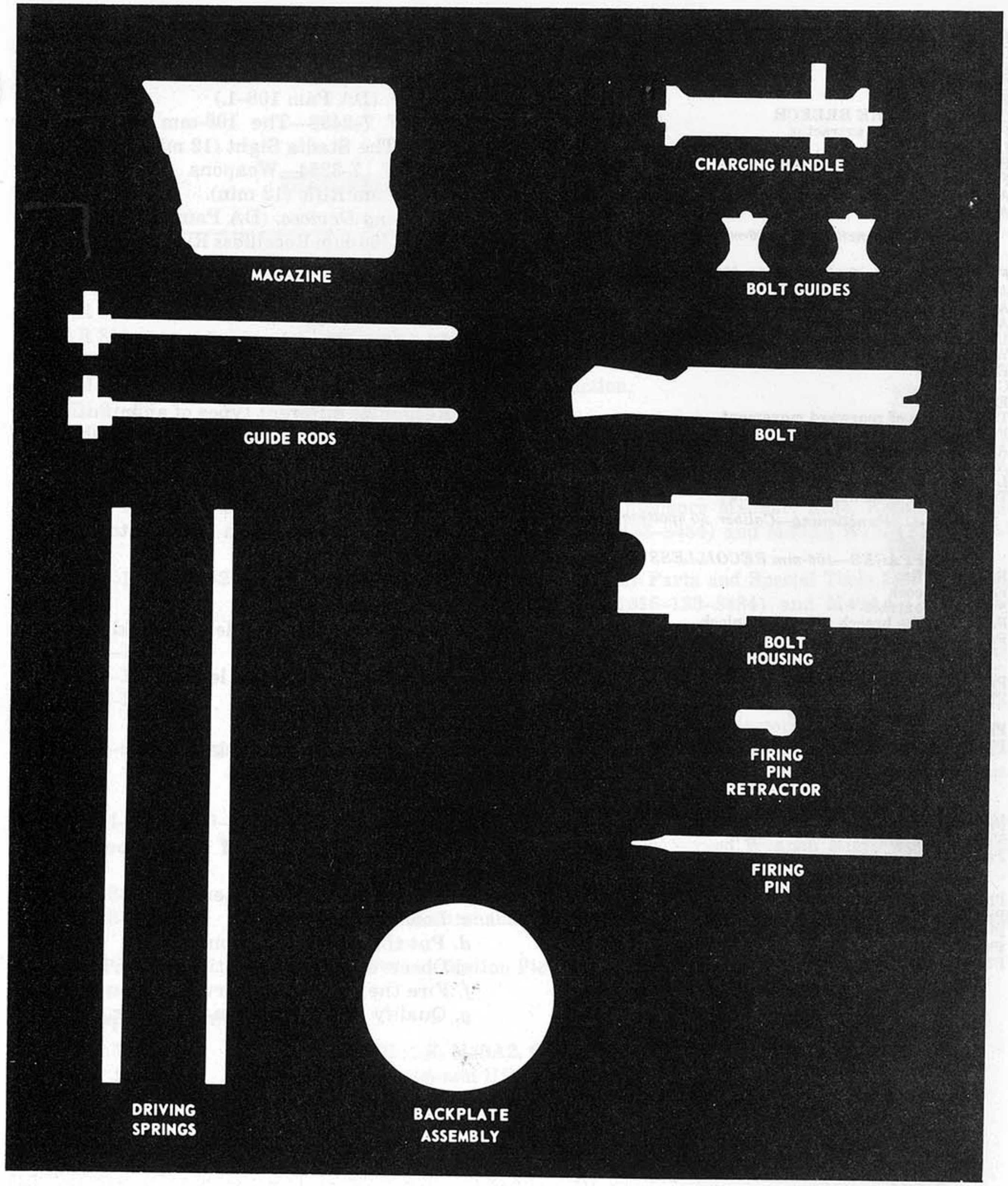


Figure 8–2. Nomenclature board and functioning setup (caliber .50 spotting gun).

FUNCTIONING—106-mm RECOILLESS RIFLE
OPENING OF THE BREECH
Unlocking
Cocking
Extraction
CLOSING OF THE BREECH
Positioning of the extractor
Locking
Positioning of the firing mechanism
FIRING OF THE PIECE
Action of the firing mechanism
Action of the gases

Figure 8–3. Functioning—106-mm recoilless rifle.

FUNCTIONING—CALIBER .50, M8
ACTION OF THE FIRE CONTROL GROUP
ACTION DURING REARWARD MOVEMENT
Action of the gases
Unlocking
Withdrawal of the firing pin
Extraction
Cocking
Ejection
Termination of rearward movement
Feeding
ACTION DURING FORWARD MOVEMENT
Action of guide rods and springs
Locking
Termination of forward movement

Figure 8–4. Functioning—Caliber .50 spotting gun.

STOPPAGES—106-mm RECOILLESS RIFLE
Failure to fire
Failure to cock
Failure to extract
Failure of the breech to lock or unlock
Failure to load

IMMEDIATE ACTION
Phase 1—Wait one minute
Phase 2—Recock, relay, attempt to fire
Again fails to fire
Phase 3—Wait one minute
Phase 4—Examine weapon and cartridge

Figure 8–5. Stoppages—106-mm recoilless rifle.

STOPPAGES—CALIBER .50, M8
Failure to fire
Failure to extract
Failure to chamber

IMMEDIATE ACTION
Phase 1—Pull the bolt to the rear
Phase 2—Tap magazine
Phase 3—Release the bolt
Phase 4—Relay
Phase 5—Attempt to fire

Figure 8–6. Stoppages—Caliber .50 spotting gun.

c. Models. (Use inert rounds.)
(1) Inert ammunition.
(2) Cutaway of ammunition.

d. Films. (DA Pam 108–1.)
(1) TF 7–2438—The 106-mm Rifle M40A1 Part VI—The Stadia Sight (12 min).
(2) TF 7–3254—Weapons System Alinement, 106-mm Rifle (12 min).

e. Training Devices. (DA Pam 310–12.)
DVC 7–17. 106-mm Recoilless Rifle Mechanism.

8–5. Mechanical Training

Men are trained to—
a. Disassemble and assemble rifles.
b. Determine causes of common stoppages and reduce them quickly.
c. Recognize different types of ammunition by color and markings, recognize capabilities of the various types of ammunition, and care for and prepare ammunition for firing.
d. Care for and clean the rifle.
e. Destroy the rifle when directed to do so.

8–6. Technique of Fire

Men are trained to—
a. Estimate range and leads quickly and accurately.
b. Determine range and leads.
c. Engage targets.
d. Control fire.
e. Prepare and use a range card.

8–7. Marksmanship

Men are trained to—
a. Perform the duties of all members of the squad.
b. Aline the weapon system.
c. Load the weapon.
d. Put the rifle into action.
e. Observe safety precautions.
f. Fire the rifle, using service ammunition.
g. Qualify as a marksman or higher.

APPENDIX A

TEXT REFERENCES AND TRAINING AIDS

A–1. References

AR 310–25	Dictionary of United States Army Terms.
AR 350–4	Qualification and Familiarization with Weapons and Weapon Systems.
FM 20–60	Battlefield Illumination.
FM 21–6	Techniques of Military Instruction.
FM 21–26	Map Reading.
FM 21–40	Chemical, Biological, Radiological, and Nuclear Defense.
FM 23–12	Technique of Fire of the Rifle Squad and Tactical Application.
TM 3–220	Chemical, Biological, and Radiological (CBR) Decontamination.
TM 9–1000–205–12	Operator and Organizational Maintenance Manual: Rifle, Recoilless, 106-mm: M40A2 W/E (FSN 1015–133–8484) and M40A4 W/E (FSN 1015–133–8485).
TM 9–1015–221–20P	Organizational Maintenance Repair Parts and Special Tools List for Rifle, Recoilless, 106-mm: M40A2 (1015–133–8484) and M40A4 (1015–133–8485).
TM 9–1300–203	Artillery Ammunition for Guns, Howitzers, Mortars and Recoilless Rifles.
TM 9–1300–206	Care, Handling, Preservation and Destruction of Ammunition.
TM 9–1580	Ordnance Maintenance: Binoculars M3, M7, M8, M9, M13, M13A1, M15, M15A1, M16, M17, and M17A1 and BC Telescope M65.
TM 9–6920–210–14	Operator, Organizational, DS and GS Support Maintenance Manual Including Basic Issue Items List and Repair Parts List: Small Arms Targets and Target Material.
TM 11–1090–269–15	Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Crew Served Weapon Night Vision Sight (FSN 1090–911–1370).
TM 38–750	The Army Maintenance Management Systems (TAMMS).
TM 38–750–1	The Army Maintenance Management Systems (TAMMS) Field Command Procedures.
DA Pam 108–1	Index of Army Motion Pictures and Related Audio-Visual Aids.

A–2. Graphic Training Aids

GTA 7–1–24	106-mm RCLR, M40A2, Gunnery.
GTA 9–466	Cartridge, 106-mm HE, AT, M344A1 w/Fuze PIBD, M509.

INDEX

	Paragraph	Page
Adjustment of fire	6–23	6–15
Aiming stakes	5–24	5–18
Alinement, weapon system	5–25	5–18
Ammunition:		
APERS–T cartridge	4–10	4–4
Care, handling, and preservation	4–12	4–5
Classification	4–7	4–3
HEAT round	4–8	4–3
HEP–T round	4–9	4–4
Spotter tracer cartridge, cal .50	4–11	4–4
Apparent speed estimation	5–5	5–7
Backblast area	6–25	6–15
Boresighting	5–26	5–18
Care in the field	4–17	4–7
Characteristics	1–2	1–1
Characteristics of fire:		
Dispersion	5–2	5–1
Trajectory	5–2	5–1
Closing the breech	2–5	2–7
Crew drill	6–4	6–3
Crew training	6–33	6–19
Data:		
RCLR, M40A2	1–2	1–1
Spotting gun	3–2	3–1
Decontamination procedures	4–18	4–8
Description:		
Direct fire sight	1–7	1–9
Instrument light, M42	1–8	1–11
Mount, M79	1–5	1–6
Recoilless Rifle, M40A2	1–4	1–4
Spotting gun	3–1	3–1
Destruction to prevent enemy use	4–19	4–8
Disassembly and assembly:		
RCLR, M40A2	2–1	2–1
Spotting gun	3–3	3–2
Dismounting the 106-mm RCLR	6–13	6–6
Duties of squad members	6–2	6–1
Examination	6–24	6–15
Field stripping:		
RCLR, M40A2	2–2	2–1
Spotting gun	3–4	3–2
Fire commands	5–7	5–9
Fire control	5–18	5–12
Firing procedure (range firing)	6–40	6–20
Firing tables:		
Instructional	7–3	7–7
Familiarization	7–7	7–8
Night fire	7–9	7–9
Qualification	7–2	7–1
Firing the piece	2–6	2–8
Immediate action:		
RCLR, M40A2	2–10	2–10
Spotting gun	3–10	3–8
Lead estimation	5–6	5–7
Logbook	4–5	4–2
Maintenance:		
RCLR, M40A2	4–13	4–5
Elbow telescopes	4–16	4–7
Mechanical functioning:		
RCLR, M40A2	2–3	2–5
Spotting gun	3–5	3–5
Misfire, procedures for unloading	6–25	6–15
Mounting the 106-mm RCLR	6–15	6–7
Night fire training	7–8	7–8
Night firing techniques	5–22	5–17
Night vision sight	5–28	5–20
Opening the breech	2–4	2–6
Principles of recoilless operation	1–3	1–1
Qualification firing	7–1	7–1
Range cards	5–23	5–17
Range determination	5–3	5–2
Range procedure	6–26	6–17
Repair parts	4–1	4–1
Safety features	2–7	2–9
Safety precautions and range procedures	6–25	6–15
Service of the piece	6–3	6–2
Stadia lines	5–3	5–2
Stoppages:		
RCLR, M40A2	2–9	2–10
Spotting gun	3–9	3–8
Subcaliber gun, M9	4–3	4–1
Training:		
Aids	8–4	8–1
Schedule	A–1	A–1
Sequence	6–17	6–7
Zeroing the subcaliber device	5–27	5–19

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-11A requirements for 106MM Recoilless Rifle, M40A1 (Qty rqr block no. 207).

☆ U. S. GOVERNMENT PRINTING OFFICE : 1974 580-852/5906A

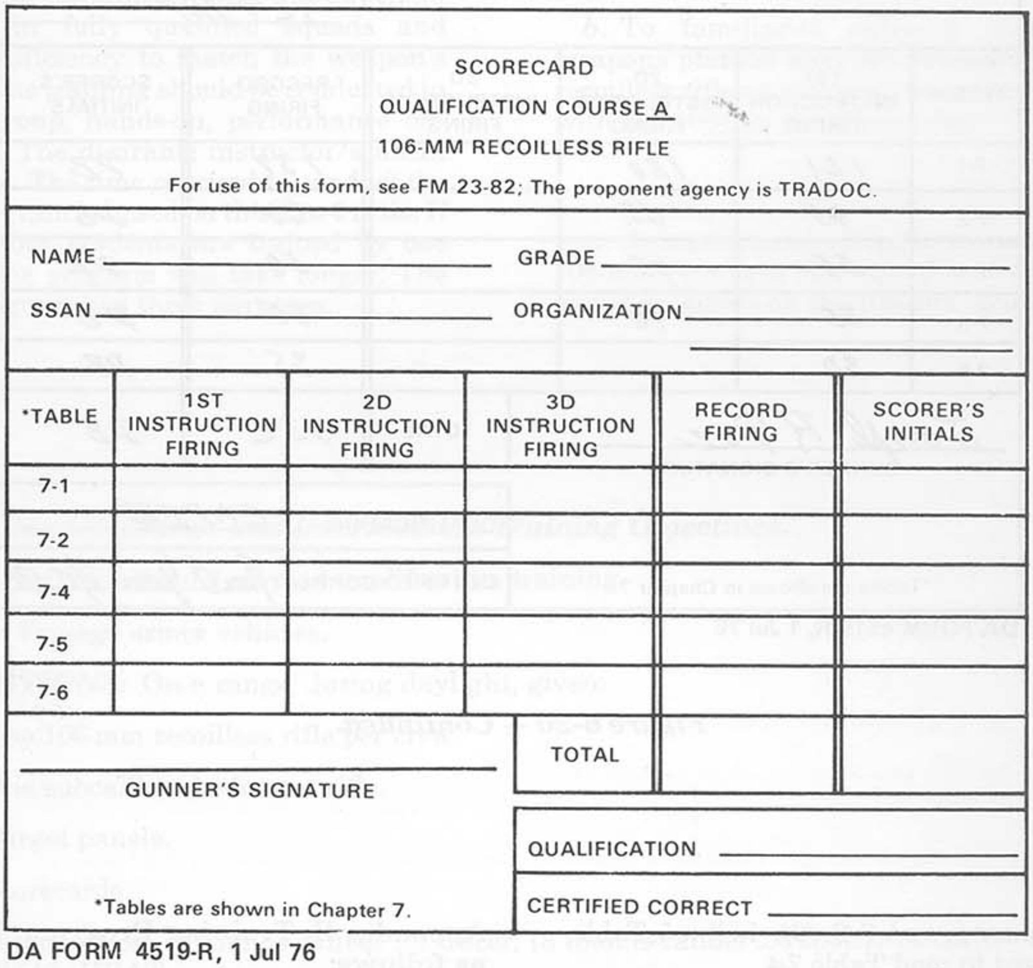
CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 10 SEPTEMBER 1976

106-MM RECOILLESS RIFLE, M40A2

FM 23-82, 30 July 1973, is changed as follows:

Page 6-21. Figure 6-20 is superseded as follows:



SCORECARD
QUALIFICATION COURSE A
106-MM RECOILLESS RIFLE
For use of this form, see FM 23-82; The proponent agency is TRADOC.

NAME ____________ GRADE ____________

SSAN ____________ ORGANIZATION ____________

*TABLE	1ST INSTRUCTION FIRING	2D INSTRUCTION FIRING	3D INSTRUCTION FIRING	RECORD FIRING	SCORER'S INITIALS
7-1					
7-2					
7-4					
7-5					
7-6					
			TOTAL		

GUNNER'S SIGNATURE

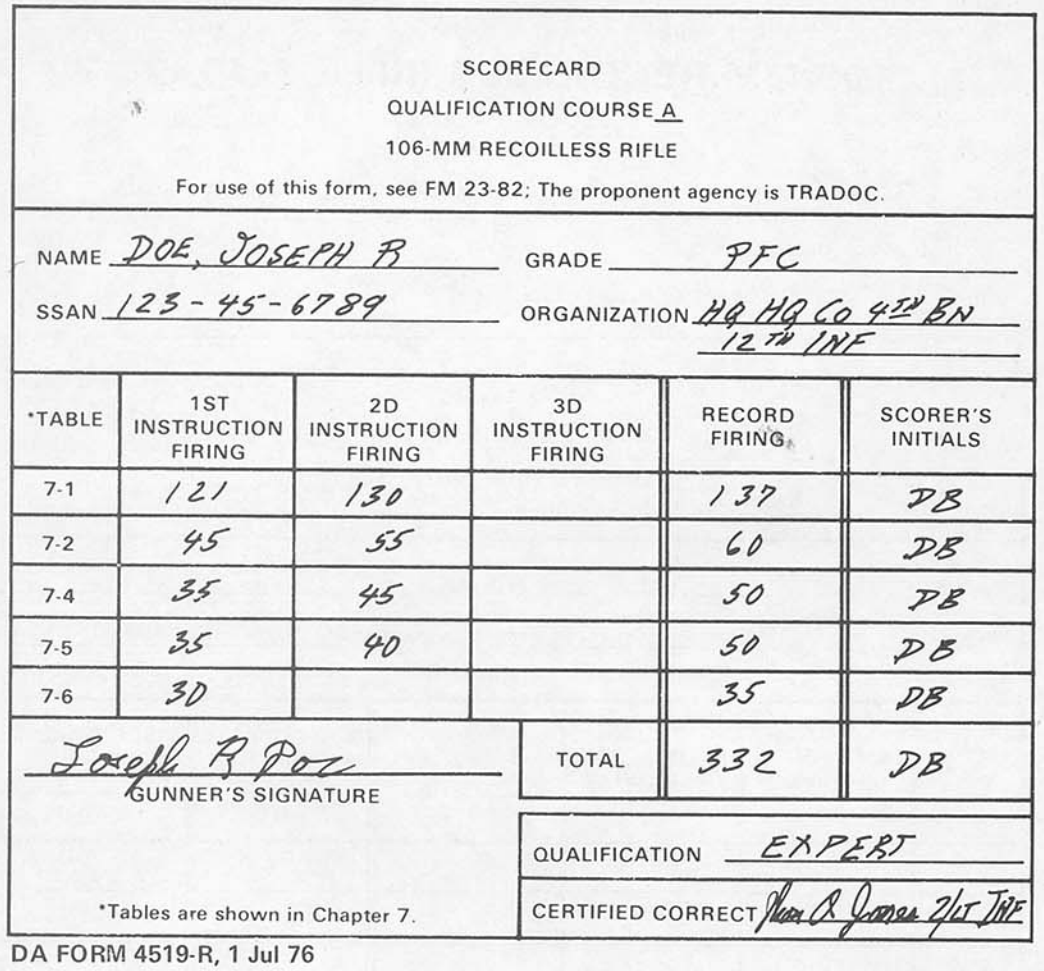
QUALIFICATION ____________

CERTIFIED CORRECT ____________

*Tables are shown in Chapter 7.

DA FORM 4519-R, 1 Jul 76

Figure 6-20. Scorecard.



SCORECARD
QUALIFICATION COURSE A
106-MM RECOILLESS RIFLE
For use of this form, see FM 23-82; The proponent agency is TRADOC.

NAME DOE, JOSEPH R
GRADE PFC
SSAN 123-45-6789
ORGANIZATION HQ HQ Co 4TH BN 12TH INF

*TABLE	1ST INSTRUCTION FIRING	2D INSTRUCTION FIRING	3D INSTRUCTION FIRING	RECORD FIRING	SCORER'S INITIALS
7-1	121	130		137	DB
7-2	45	55		60	DB
7-4	35	45		50	DB
7-5	35	40		50	DB
7-6	30			35	DB
			TOTAL	332	DB

Joseph R Doe
GUNNER'S SIGNATURE

QUALIFICATION EXPERT
CERTIFIED CORRECT [illegible] A Jones 2/Lt INF

*Tables are shown in Chapter 7.

DA FORM 4519-R, 1 Jul 76

Figure 6-20 -- Continued.

Page 7-5, paragraph 7-2c(2). In line 5, Table IV is changed to read Table 7-4.

Appendix B, Training Program, is added as follows:

APPENDIX B

TRAINING PROGRAM

Section I. GENERAL

B-1. Purpose. This appendix provides guidance for training and evaluating 106-mm recoilless rifle squads, antitank squads, antitank platoons, and weapons platoons in all components of the Army. Successful completion of the program contained within this appendix will result in fully qualified squads and improved proficiency to match the weapon's capability. The training should be conducted in the small group, hands-on, performance oriented mode. The desirable instructor/student ratio is 1 to 4. The time required to conduct the training program is based on this 1 to 4 ratio. If more than four students are trained by one instructor, the program will take longer. The training program has three purposes:

a. To qualify 106-mm recoilless rifle squad and/or antitank squad members on the 106-mm recoilless rifle.

b. To familiarize antitank platoon and weapons platoon members (excluding 106-mm recoilless rifle squads and/or antitank squads) with the 106-mm recoilless rifle.

c. To conduct night familiarization firing for 106-mm recoilless rifle squad and/or antitank squad members on the 106-mm recoilless rifle.

B-2. Training Objectives and Intermediate Training Objectives.

a. Training Objective 1. Squad qualification training.

TASK: Engage armor vehicles.

CONDITIONS: On a range, during daylight, given:

(1) One 106-mm recoilless rifle per crew.

(2) One subcaliber device per rifle.

(3) Target panels.

(4) Scorecards.

(5) Ammunition: 72 rounds caliber .30 tracer; 18 rounds caliber .50 spotter-tracer; 6 rounds M344A1, HEAT.

TRAINING STANDARDS: Achieve an overall score of 238 or higher in firing tables 7-1, 7-2, 7-4, 7-5, and 7-6, Qualification Course A, chapter 7, FM 23-82.

Intermediate Training Objectives (ITO).

ITO #1.

TASK: Adjust the gas regulating needle in the caliber .50 spotting gun.

CONDITIONS: During daylight, on a range, acting as a 106-mm recoilless rifle crew member, given a 106-mm recoilless rifle with spotting gun, M8 combination tool, 4 caliber .50 spotting rounds.

STANDARD: Cause the caliber .50 spotting gun to chamber the cartridge properly within 5 minutes.

ITO #2.

TASK: Aline the caliber .50 spotting gun with the axis of the 106-mm recoilless rifle.

CONDITION: On a range, during daylight, acting as a 106-mm recoilless rifle crew member, given: A 106-mm recoilless rifle with spotting gun, M8 combination tool, 1 HEAT round, 4 caliber .50 rounds.

STANDARD: In accordance with one of the two methods described in FM 23-82, paragraph 5-26b.

ITO #3.

TASK: Operate the caliber .50 spotting gun for the 106-mm recoilless rifle.

CONDITION: On a range, during daylight, acting as a gunner, given: A 106-mm recoilless rifle with spotting gun, 2 caliber .50 spotting rounds.

STANDARD: In accordance with FM 23-82, paragraph 3-6.

ITO #4.

TASK: Sight the 106-mm recoilless rifle on an armored target.

CONDITION: On a range, during daylight, acting as gunner, provided: Moving and stationary armored targets or silhouettes, a 106-mm recoilless rifle with M92F sight.

STANDARD: Sighted within 15 seconds from identification of target in accordance with FM 23-82, chapter 5.

ITO #5.

TASK: Traverse, elevate, and depress the 106-mm recoilless rifle.

CONDITION: On a range, during daylight, acting as a gunner, provided: Moving and stationary armored targets or silhouettes, a 106-mm recoilless rifle with M92F sight.

STANDARD: Using the elevating and traversing handwheels, correctly lay the rifle on three of four stationary targets and three of four moving targets, in accordance with FM 23-82, chapter 6, paragraphs 6-19 thru 6-22.

ITO #6.

TASK: Describe the 106-mm recoilless rifle backblast area.

CONDITION: On a range, during daylight.

STANDARD: In accordance with FM 23-82, figure 6-17 and paragraph 6-25b.

ITO #7.

TASK: Perform misfire procedures.

CONDITION: On a range, during daylight, given a 106-mm recoilless rifle with a simulated misfire.

STANDARD: The soldier will perform misfire procedures without hesitation and in accordance with FM 23-82, paragraph 6-25g.

ITO #8.

TASK: Describe the duties of a 106-mm recoilless rifle gunner and loader.

CONDITION: On a range, during daylight, given a 106-mm recoilless rifle.

STANDARD: In accordance with FM 23-82, paragraph 6-2.

ITO #9.

TASK: Load and clear the subcaliber device.

CONDITION: On a range, during daylight, given a 106-mm recoilless rifle, subcaliber device, 1 round of caliber .30 tracer ammunition.

STANDARD: The soldier will load and clear the subcaliber device in accordance with FM 23-82, chapter 4, paragraphs 4-3 and 4-4, and chapter 6, paragraph 6-3.

ITO #10.

TASK: Zero the subcaliber device.

CONDITION: On a range, during daylight, given a 106-mm recoilless rifle, subcaliber device, screwdriver, 6 rounds of caliber .30 tracer ammunition.

STANDARD: The soldier will zero the subcaliber device using the 6 rounds within 10 minutes.

ITO #11.

TASK: Fire the 106-mm recoilless rifle and caliber .50 spotting gun.

CONDITION: On a range, during daylight, given a 106-mm recoilless rifle, 1 round HEAT and 1 round caliber .50 spotter tracer ammunition.

STANDARD: Fire the rifle or spotting gun, by use of the firing knob, at will.

ITO #12.

TASK: Demonstrate the burst-on-target method of adjustment with the 106-mm recoilless rifle.

CONDITION: On a range, during daylight, acting as a gunner, given: A 106-mm recoilless rifle with sight, an armored target, 1 round M344A1 HEAT, 3 rounds caliber .50 spotter tracer.

STANDARD: Achieve a target hit within 30 seconds utilizing the burst-on-target method of fire adjustment as prescribed in FM 23-82, paragraph 5-20c.

ITO #13.

TASK: Demonstrate the spotting gun method of adjustment with the 106-mm recoilless rifle.

CONDITION: On a range, during daylight, acting as a gunner, given: A 106-mm recoilless rifle with sight, an armored target, two rounds M344A1 HEAT, 4 rounds caliber .50 spotter tracer.

STANDARD: Achieve a target hit within 1½ minutes utilizing the spotting gun method of fire adjustment as prescribed in FM 23-82, paragraph 5-20b.

ITO #14.

TASK: Demonstrate the observation of tracer method of adjustment with the 106-mm recoilless rifle.

CONDITION: On a range, during daylight, acting as a gunner, given: A 106-mm recoilless rifle with sight, an armored target, 1 round M346A1 HEP-T, 3 rounds caliber .50 spotter tracer.

STANDARD: Achieve a target hit within 30 seconds, utilizing the observation of tracer method of fire adjustment as prescribed in FM 23-82, paragraph 5-20d.

b. ***Training Objective 2.*** Antitank/weapons platoon familiarization.

TASK: Engage armor vehicles.

CONDITION: On a range, during daylight, given:

(1) One 106-mm recoilless rifle per four individuals.

(2) One subcaliber device per rifle.

(3) Target panels.

(4) Ammunition: 15 rounds, caliber .30 tracer; 8 rounds, caliber .50 spotter-tracer; 2 rounds, M344A1, HEAT.

TRAINING STANDARD: The soldier will fire tables 7-7 and 7-8, chapter 7, FM 23-82, and achieve 10 or more target hits with the 15 rounds of caliber .30 tracer ammunition fired, by observing the tracer and strike of the round and making appropriate adjustments. The soldier will also achieve one target hit in two attempts using M344A1 HEAT ammunition.

NOTE: ITOs #1-14 must be addressed in the Familiarization Program. The amount of time devoted to each of the above ITOs will be reduced in the Familiarization Program while adhering to established safety procedures.

c. ***Training Objective 3.*** Night familiarization firing.

TASK: Engage armor vehicles.

CONDITIONS: On a range, during the hours of darkness, given:

(1) One 106-mm recoilless rifle per crew.

(2) One subcaliber device.

(3) One night light per crew.

(4) One AN/TVS-2 per rifle.

(5) Targets.

(6) Illumination.

(7) Ammunition: 12 rounds caliber .30 tracer; 24 rounds caliber .50 spotter-tracer.

TRAINING STANDARD: The soldier will fire tables 7-9 and 7-10, chapter 7, FM 23-82 and achieve 8 or more target hits with the 12 rounds of caliber .30 tracer ammunition fired, by observing the tracer and strike of the round and making appropriate adjustments.

Intermediate Training Objectives.

ITO #1.

TASK: Engage an armored target with the 106-mm recoilless rifle.

CONDITION: On a range, during darkness, acting as a gunner, given: Illumination support, armored targets at various ranges (within the maximum effective range), 12 caliber .50 spotter tracers, 6 M344A1 HEAT rounds, 106-mm recoilless rifle with sight, one flashlight.

STANDARD: Fire the recoilless rifle and achieve target hits with one of the two rounds on each of the armored targets under available illumination using firing table 7-9, FM 23-82 as a reference.

ITO #2

TASK: Demonstrate the night aiming stakes method for the 106-mm recoilless rifle.

CONDITION: On a range, during darkness, acting as a gunner, given: A 106-mm recoilless rifle with sight, two sets of aiming stakes, a night light M43, four aiming stake night lights, one flashlight, 2 rounds M344A1 HEAT, 4 rounds caliber .50 spotter tracer, an armored target.

STANDARD: Achieve one target hit of two HEAT rounds fired using the method as described in FM 23-82, paragraph 5-24.

ITO #3.

TASK: Mount and aline the AN/TVS-2 night vision sight on the 106-mm recoilless rifle.

CONDITION: On a range, during daylight, acting as a 106-mm recoilless rifle crew member, given: One AN/TVS-2 night vision sight, one 106-mm recoilless rifle with sight, two 8-inch pieces of string, two rubber bands, boresight disc; the spotting gun and recoilless rifle are already alined.

STANDARD: Within 5 minutes, in accordance with FM 23-82, paragraphs 5-28, 5-29, 5-30.

ITO #4.

TASK: Install and operate the M42 instrument light on the 106-mm recoilless rifle.

CONDITION: On a range, at night, acting as a 106-mm recoilless rifle crew member, given a 106-mm recoilless rifle, an M42 instrument light.

STANDARD: Mount the instrument light on the recoilless rifle in accordance with FM 23-82, paragraph 1-8 and adjust the rheostat knob to control the intensity of reticle illumination.

B-3. General Training Notes.

a. Training is divided into three areas. The Qualification Program is designed to train and evaluate members of the 106-mm recoilless rifle squads and antitank squads equipped with the 106-mm recoilless rifle. The Familiarization Program is designed to train the antitank platoon and weapons platoon members (excluding the 106-mm recoilless rifle squad and antitank squad members) on the 106-mm recoilless rifle. This training is deemed critical to enable those personnel who are not members of the 106-mm recoilless rifle or antitank squad to accurately fire the recoilless rifle should the situation arise. Finally, the Night Familiarization Program is designed to train the members of the 106-mm recoilless rifle and antitank squads in the preparation of range cards and night firing techniques.

b. The training program should be used in conjunction with chapters 6 and 7 of this field manual. Chapter 6 addresses preparatory marksmanship, to include crew drill, squad training, safety, and range procedures. In chapter 7, marksmanship training is outlined in detail, to include the qualification and familiarization tables. All instructors must be intimately familiar with the material contained in chapters 6 and 7 prior to undertaking the training program.

c. The following is the sequence of the 106-mm recoilless rifle Qualification Program:

(1) Day one.

(a) Characteristics, capabilities and ammunition of the 106-mm recoilless rifle	1 hr
(b) Functioning, common stoppages, and maintenance of the 106-mm recoilless rifle	2 hrs
(c) Crew drill (may be integrated into other training	1 hr
(d) Positions, sighting and aiming, tracking and fire adjustment	6 hrs
	10 hrs

(2) Day two.

(a) Weapon system alinement and zeroing subcaliber devices	3 hrs
(b) Examination	1 hr
(c) Instructional firing, tables 7-1 and 7-2	2 hrs
(d) Qualification firing, tables 7-1 and 7-2	2 hrs
	8 hrs

(3) Day three.

(a) Instructional firing, tables 7-3, 7-4, and 7-5	3 hrs
(b) Qualification firing, tables 7-3, 7-4, and 7-5	3 hrs
(c) Field firing, table 7-6	3 hrs
	9 hrs

(4) Summary of total hours.

(a) Day one	10 hrs
(b) Day two	8 hrs
(c) Day three	9 hrs
(d) TOTAL	27 hrs

NOTE: The Qualification Program is course A, found in FM 23-82, chapter 7. Course B or Course C may be conducted in lieu of Course A, depending on available facilities and the type course desired. All tables referenced are found in chapter 7. This Qualification Program, as written, is compressed to minimum time. When scheduled, consideration must be given to holidays, poor weather, equipment availability, and instructor/student ratio greater than 1:4. Any of these conditions will dictate additional time. Recommended normal scheduling is 3 days.

d. The following is the sequence of the 106-mm recoilless rifle Familiarization Program:

(1) General characteristics, disassembly and assembly of the 106-mm recoilless rifle and caliber .50 spotting gun	1 hr
(2) Functioning, stoppages and immediate action, ammunition, and care and cleaning of the 106-mm recoilless rifle and caliber .50 spotting gun; caliber .30 subcaliber device	1 hr
(3) Crew drill and service of the 106-mm recoilless rifle	1 hr
(4) Safety precautions, positions, aiming, firing knob manipulation, breathing exercises, and weapons system alinement	2 hrs

(5) Familiarization firing, tables 7-7 and 7-8 . . . . 2 hrs

(6) Range determination, apparent speed, lead determination, fire control and fire commands . . . . 1 hr

8 hrs

NOTE: All tables referenced are found in chapter 7. This Familiarization Program, as written, is compressed to minimum time. When scheduled, consideration must be given to poor weather, equipment availability and instructor/student ratio greater than 1:4. Any of these conditions will dictate additional time. Recommended normal scheduling is 1 day.

e. The following is the sequence of the 106-mm recoilless rifle Night Familiarization Program:

(1) Range cards; familiarization firing, table 7-9 (night firing) . . . . 2 hrs

(2) Familiarization firing, table 7-10 (night firing) 2 hrs

4 hrs

NOTE: All tables referenced are found in chapter 7. This Night Familiarization Program, as written, is compressed to minimum time. When scheduled, consideration must be given to poor weather, equipment availability and instructor/student ratio greater than 1:4. Any of these conditions will dictate additional time. Recommended normal scheduling is 4 hours.

f. The training program is based on performance-oriented training. Time devoted to conference, explanation, and demonstration has been minimized. The soldier will learn by doing rather than by listening and watching. Emphasis should be on the small group, hand-on method of achieving the training objectives. Soldiers should practice the actions in the training objectives until they become proficient. When the soldier appears proficient, he should be tested by a noncommissioned officer on a pass/fail or GO/NO GO basis. If the soldier fails a GO/NO GO test, he should continue to practice and be retested. Those soldiers who have passed the GO/NO GO test may be used to assist in the training evaluation of the soldiers experiencing difficulty. The recommended soldier/instructor ratio is 4:1.

g. Training aids and equipment.

(1) Inert HEAT, HEPT, APERS-T and caliber .50 rounds - 1 of each round.

(2) Nomenclature boards - 1 per four soldiers.

(3) Target panels.

(4) Targets.

(5) Scorecards - 1 per soldier.

(6) Chart - M92F sight reticle - 1 per squad/platoon.

(7) Blackboard - 1 per squad/platoon.

(8) Cleaning materials.

(9) Graphical Training Aids (GTA) 7-1-24 and 9-466.

(10) 106-mm recoilless rifle, ¼-ton truck mounted (complete) - 1 per four soldiers (crew).

(11) Subcaliber gun, M9 - 1 per 106-mm recoilless rifle.

(12) Boresighting disc - 1 per 106-mm recoilless rifle.

(13) Combination tool - 1 per 106-mm recoilless rifle.

(14) Instrument light M42 - 1 per 106-mm recoilless rifle.

(15) Night Vision Sight, AN/TVS-2 (complete) - 1 per 106-mm recoilless rifle.

(16) Public address system - 1.

h. Training facilities and personnel.

(1) Facilities. Range (with bleachers) which is suitable for firing both subcaliber and major caliber ammunition. Additionally, range should have facilities to conduct concurrent training.

(2) Personnel. One instructor per four soldiers. Should more than four soldiers be taught by an instructor, the time to conduct the training program will be increased.

i. Ammunition. The ammunition requirements are set forth in chapter 7.

j. For additional information on how to conduct a training program, see FM 21-6, How to Prepare and Conduct Military Training; ARTEP 7-15, Light Infantry Battalion; and ARTEP 7-45, Mechanized Infantry Battalion and Combined Arms Task Force. FM 21-6 provides detailed guidance on the preparation of lesson plans.

FM 23-82
C1

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

DISTRIBUTION:

Active Army, USAR, ARNG: To be distributed in accordance with DA Form 12-11A, Requirements for 106-mm Recoilless Rifle, M40A1 (Qty rqr block no. 207); plus, DA Form 12-12, Section III, for units having a requirement for training publications relating to TOE 7-45, 7-46, 7-47, 7-48, 17, 37, and 37-100 (5 copies each account).

Additional copies can be requisitioned (DA Form 17) from the US Army Adjutant General Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220.

☆U.S. GOVERNMENT PRINTING OFFICE: 1976—0-211-373/66498